

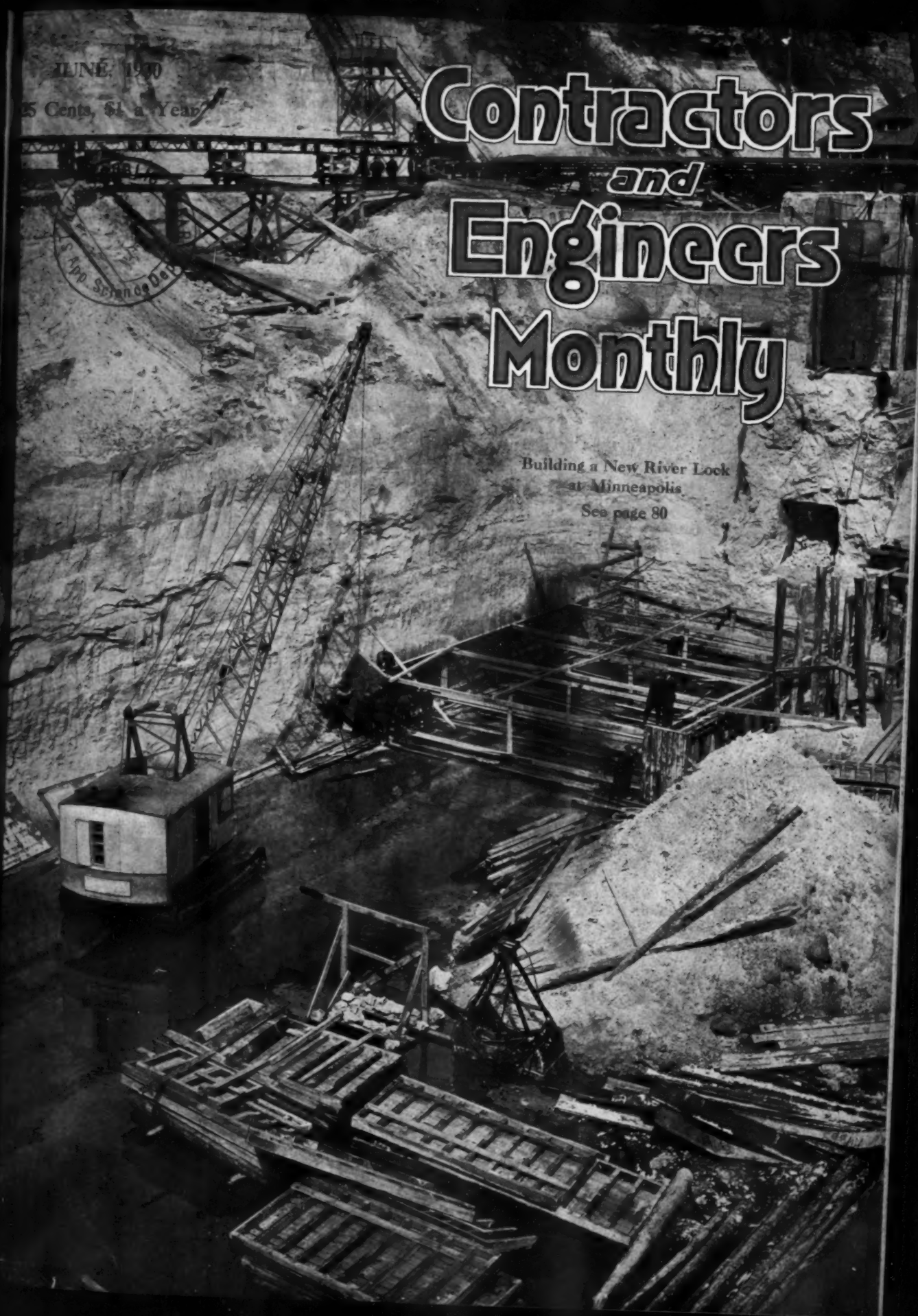
JUNE 1970

5 Cents, \$1 a Year

Contractors *and* Engineers Monthly

Building a New River Lock
at Minneapolis

See page 80



Blast Holes Drilled with Speed by a Hercules-Powered Rig



To drill blast holes for dynamiting ahead of the shovels, the Cable Company of Canton, Ohio, used a Hercules-Powered Cyclone Drill in completing a million-cubic-foot excavation for the Goodyear-Zeppelin Air Dock at Akron.

Including moving time the Hercules-Equipped rig drilled an average of 86 feet a day, keeping well in advance of the shovels. Without dynamiting the shale, sandstone and heavy clay, the shovels could have made little headway—but they moved the loosened material quickly; completed the job on scheduled time.

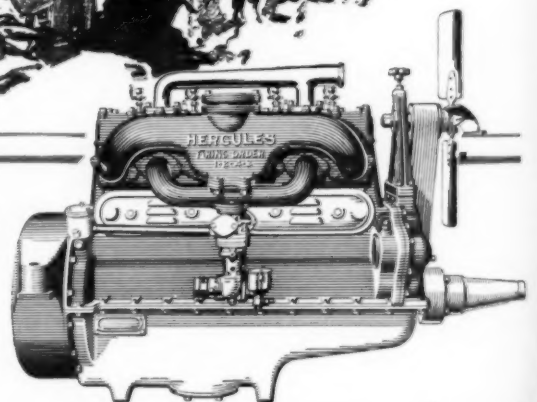
Practically all types of contracting and industrial equipment are available with Hercules Engines as standard power. Hercules Engines and Power Units—built expressly for heavy-duty service—are also obtainable in a wide range of sizes for powering equipment developed for specific jobs.

HERCULES MOTORS CORPORATION, CANTON, OHIO

West Coast Branch: Los Angeles, Cal.

Mid-Continent Branch: Tulsa, Okla.

HERCULES ENGINES



Where to Purchase

A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment. The index of Advertisers faces the inside back cover. When writing to advertisers please mention the CONTRACTORS & ENGINEERS MONTHLY. A star (*) before the manufacturer's name indicates that his advertisement appears in this issue.

This index is published as an aid to the reader, but the publishers assume no responsibility for errors or omissions.

AIR COMPRESSORS

*Albia-Chalmers Mfg. Co., Milwaukee
*Buhl Company, Chicago
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Independent Pn. Tool Co., Chicago
*National Brake & Elec. Co., Milwaukee
*Novo Engine Co., Lansing, Mich.
*Sullivan Machinery Co., Chicago
Acme Road Machy. Co., Frankfort, N. Y.
Bessemer Gas Engine Co., Grove City, Pa.
Cement-Gun Co., Allentown, Pa.
Chicago Pneumatic Tool Co., N. Y.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
De Laval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago
Gardner-Denver Co., Quincy, Ill.
General Electric Co., Schenectady, N. Y.
Hardie-Tynes Mfg. Co., Birmingham, Ala.
Hobart Bros. Co., Troy, O.
Indiana Pump & Compr. Co., Indianapolis, Ind.
Ingersoll-Rand Co., N. Y.
Nordberg Mfg. Co., Milwaukee
Norwalk Co., So. Norwalk, Conn.
Schramm, Inc., West Chester, Pa.
United Iron Works, Kansas City, Mo.
Westinghouse Traction Brake Co., Wilmerding, Pa.
Worthington Pump & Machinery Corp., N. Y.
Yeomans Bros. Co., Chicago

AIR COMPRESSORS, PORTABLE

*Buhl Co., Chicago
*Chain Belt Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Independent Pn. Tool Co., Chicago
*Metalweld, Inc., Philadelphia, Pa.
*National Brake & Elec. Co., Milwaukee
*O. E. Glutch & Mach. Co., Columbia, Pa.
*Sullivan Machinery Co., Chicago
Chicago Pneumatic Tool Co., New York
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., New York
Paasche Air Brush Co., Chicago
Schramm, Inc., West Chester, Pa.
Sterling Machy. Corp., Kansas City, Mo.
Wayne Co., Ft. Wayne, Ind.

ARTESIAN WELL DRILLS & PUMPS

American Well Works, Aurora, Ill.
Ingersoll-Rand Co., New York
Star Drilling Machine Co., Akron, O.

ASPHALT

*Colphalt Co., Cleveland
*Standard Oil Co. (Ind.), Chicago
*Standard Oil Co. (N. Y.), N. Y.
Atlantic Ref. Co., Inc., Philadelphia
Barber Asphalt Co., Philadelphia
Gulf Refining Co., Pittsburgh
Ky. Rock Asph. Co., Louisville, Ky.
Natural Rk. Asph. Corp., Owensboro, Ky.
Pioneer Asph. Co., Lawrenceville, Ill.
Sinclair Ref. Co., Chicago
Standard Oil Co. of Cal., S. Francisco
Standard Oil Co. of La., N. Orleans
Standard Oil Co. of N. J., Newark
Texas Co., N. Y.
Utah Rock Asphalt Corp., Pueblo, Colo.
Warren Bros. Co., Boston

ASPHALT BLOCK

Hastings Pavement Co., N. Y.

ASPHALT BRICK

Asphalt Brick Co., St. Louis

ASPHALT CUTTERS

*Sullivan Machinery Co., Chicago
*Independent Pn. Tool Co., Chicago, Ill.
*Littleford Bros., Cincinnati
Chicago Pneumatic Tool Co., N. Y.
Dayton Pneum. Tool Co., Dayton, O.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., N. Y.

ASPHALT EMULSIONS

American Bitumela Co., Baltimore, Md.
Colphalt Co. of Ohio, Cleveland
Colprovia Roads, Inc., New York
Flintkote Co., Boston
Headley Emulsified Prod. Co., Phila.

ASPHALT KETTLES (See Kettles for Asphalt and Tar Heating)

ASPHALT PLANTS, TOOLS, ETC.

*Chausse Oil Burner Co., Elkhart, Ind.
*Conner & Company, Philadelphia
*P. D. Cummer & Son Co., Cleveland
*Littleford Bros., Cincinnati
*Meriman Asphalt Plant, Inc., Lima, O.
*Mohawk Asphalt Heater Co., Schenectady, N. Y.
Aeroli Burner Co., West New York, N. J.
American Fin-Mix Co., Chicago
American Fork & Hoe Co., Cleveland
American Steel Wks., Kansas City, Mo.
Barber Asphalt Co., Philadelphia
Charleroi Iron Wks., Charleroi, Pa.
J. D. Farasey Mfg. Co., Cleveland, O.
Hetherington & Berner, Indianapolis
Hauck Mfg. Co., Brooklyn, N. Y.
Warren Bros. Co., Boston
Western Wheeled Scraper, Aurora, Ill.

ASPHALT POURING POTS (See Pots, Asphalt Pouring)

ASPHALT ROLLERS (See Road Rollers)

ASPHALT SURFACE HEATERS

*Chausse Oil Burner Co., Elkhart, Ind.
*Littleford Bros., Cincinnati
Aeroli Burner Co., West New York, N. J.
Barber Asphalt Co., Philadelphia
Equitable Asp. Maint. Co., Kan. City, Mo.
Hauck Mfg. Co., Brooklyn, N. Y.

BACKFILLERS

*Baker Mfg. Co., Springfield, Ill.
*Bay City Shovels, Inc., Bay City, Mich.
*Buckeye Trac. Ditcher Co., Findlay, O.
*General Excavator Co., Marion, O.
*General Wheelbarrow Co., Cleveland
*Koehring Co., Milwaukee, Wis.
*Osgood Company, Marion, Ohio
*Parsons Co., Newton, Ia.
*Speeder Mch. Corp., Cedar Rapids, Iowa
*W-K-M Co., Houston, Tex.
Austin Mach. Corp., Muskegon, Mich.
Bucyrus-Erie Co., Erie, Pa.
Byers Mach. Co., Ravenna, O.
Cleveland Trencher Co., Euclid, Ohio
Construction Machy. Co., Waterloo, Ia.
Ersted Mfg. Co., Portland, Ore.
Harnischfeger Corp., Milwaukee, Wis.
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa
Link-Belt Co., Chicago
Orton Crane & Shovel Co., Chicago
Star Drilling Mach. Co., Akron, O.
Weller Mfg. Co., Chicago

BAGS

Bates Valve Bag Corp., Chicago

BAG TRUCKS

Bates Valve Bag Corp., Chicago
Case Crane & Engg. Co., Columbus, O.

BALING PRESSES

Economy Baler Co., Ann Arbor, Mich.

BAR BENDERS AND CUTTERS

*Koehring Co., Milwaukee, Wis.
*Ransome Conc. Machy. Co., Dunellen, N. J.
Buffalo Forge Co., Buffalo, N. Y.
Concrete Steel Co., N. Y.
Electric Welding Co., Pittsburgh
D. A. Hinman & Co., Sandwich, Ill.
J. L. Gleason & Co., Boston, Mass.
Kardong Bros., Minneapolis
McKenna Co., Cleveland, O.

BARRICADE SUPPORTS

Cleveland Steel Spec. Corp., Cleveland, O.

BAR TIES

Bates Valve Bag Corp., Chicago
Symons Clamp & Mfg. Co., Chicago

BATCH BOXES

*Blaw-Knox Co., Pittsburgh, Pa.
*Butler Bin Co., Waukesha, Wis.

*Erie Steel Const. Co., Erie, Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.
*Jos. Honhorst Co., Cincinnati
*Lakewood Eng. Co., Cleveland, O.
*Littleford Bros., Cincinnati
Easton Car & Const. Co., Easton, Pa.
Easton Car & Const. Co. of Mo., Kansas C., Mo.
Fairfield Engineering Co., Marion, Ohio
Koppel Ind. Car & Equip. Co., Koppel, Pa.
Jas. B. Seaverns Co., Batavia, Ill.
Western Wheeled Scraper Co., Aurora, Ill.

BATCHERS (For Measuring Aggregates)

*Butler Bin Co., Waukesha, Wis.
*Blaw-Knox Co., Pittsburgh, Pa.
*Erie Steel Const. Co., Erie, Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.
Fairfield Engineering Co., Marion, Ohio
Superior Engineering Co., Warren, Ohio

BEARINGS

Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bear. Co., Harrison, N. J.
Link-Belt Co., Chicago
New Departure Mfg. Co., Bristol, Conn.
S. K. F. Industries, New York
Timken Roller Bearing Co., Canton, O.

BINS, STORAGE

*Austin-Western Rd. Mach. Co., Chicago
*Blaw-Knox Co., Pittsburgh, Pa.
*The Burch Corp., Crestline, Ohio
*Butler Bin Co., Waukesha, Wis.
*Erie Steel Const. Co., Erie, Pa.
*Good Roads Mch. Co., Kennett Sq., Pa.
*Heltzel Stl. Form & Ir. Co., Warren, Ohio
*Industrial Brownhoist Corp., Cleveland, O.
*Ransome Conc. Machy. Co., Dunellen, N. J.
Austin Mfg. Co., Chicago
Beaumont Mfg. Co., Philadelphia
Birmingham Tank Co., Birmingham, Ala.
Canton Art Metal Co., Canton, Ohio
Easton Car & Const. Co., Easton, Pa.
Fairfield Engineering Co., Marion, Ohio
O. B. Johnson Co., Champaign, Ill.
Lancaster Iron Works, Inc., Lancaster, Pa.
Link-Belt Co., Chicago
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Jas. B. Seaverns Co., Batavia, Ill.
Superior Engineering Co., Warren, Ohio
Universal Rd. Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

BITUMULS PAVEMENT

American Bitumula Co., Baltimore, Md.

BLADES FOR GRADERS & SNOW PLOWS

*Caterpillar Tractor Co., San Leandro, Cal.

*General Wheelbarrow Co., Cleveland

J. D. Adams Co., Indianapolis
Gallion Iron Works & Mfg. Co., Gallion, Ohio
Shunk Mfg. Co., Bucyrus, Ohio

BLAST HOLE DRILLING MACHINES (See Well Drilling and Blast Hole Machines)

BLASTING POWDER (See Explosives)

BLOCKS AND TACKLE

*Boston & Lockport Bk. Co., Boston, Mass.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*Western Block Co., Lockport, N. Y.
Upson-Walton Co., Cleveland

BLOW TORCHES

*Chausse Oil Burner Co., Elkhart, Ind.
*Littleford Bros., Cincinnati
*G. H. Williams Co., Erie, Pa.
American Steel Wks., Kansas City, Mo.
Everhot Mfg. Co., Maywood, Ill.
Hauck Mfg. Co., Brooklyn, N. Y.

BLUE PRINT MACHINES

Paragon Revolute Corp'n, Rochester, N. Y.
C. F. Pease Co., Chicago
Wickes Bros., Saginaw, Mich.

BODIES, CONCRETE, AGITATOR & MIXER

Biehl Iron Works, Reading, Pa.
Blaw-Knox Co., Pittsburgh
Barrymore Conc. Mixer Corp., San Francisco
Good Rdz. Machy. Corp., Kennett Sq., Pa.

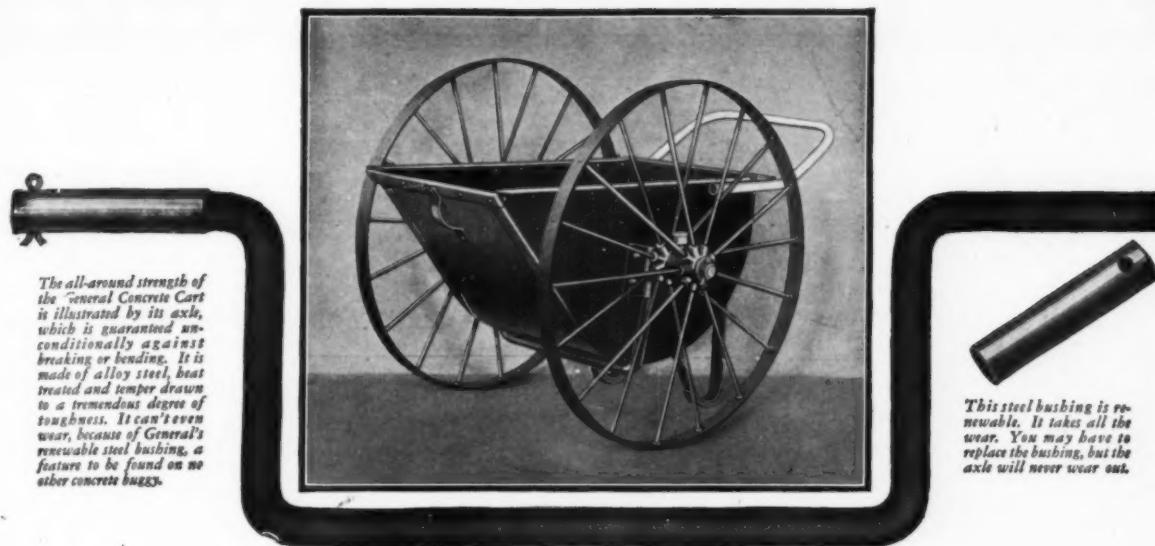
For Directory of Local Distributors of Contractors' Equipment, See Pages 143-170



WHERE TO PURCHASE

- Highway Truck Mixer Co., Cleveland
Lee Transit Mixer Co., Indianapolis
Parke Conc. Carrier, Inc., New York
Transit Mixers, Inc., San Francisco
- BOILERS**
*Johnston Bros. Inc., Ferrysburg, Mich.
*Manitowoc Eng'g Wks., Manitowoc, Wis.
Babcock & Wilcox Co., New York
Chandler & Taylor Co., Indianapolis
Chatta. Boiler & Tank Co., Chatta., Tenn.
R. D. Cole Mfg. Co., Newnan, Ga.
Erie City Iron Works, Erie, Pa.
Hartley Blr. Works, Montgomery, Ala.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Heine Boiler Co., St. Louis, Mo.
E. Keeler Co., Williamsport, Pa.
Jas. Leffel & Co., Springfield, Ohio
Burnham Boiler Corp., Irvington, N. Y.
Murray Iron Works Co., Burlington, Iowa
Nagle Eng. & Blr. Works, Erie, Pa.
New Barn Iron Works & Snp. Co., New Barn, N. C.
Orr & Sombower, Reading, Pa.
Petroleum Iron Works Co., Sharon, Pa.
J. S. Schofield's Sons Co., Macon, Ga.
Stanwood Corp., Cincinnati, Ohio
Superior Body Corp., Marion, Ind.
Vogt Mch. Co., Inc., Louisville, Ky.
- BRACES, TRENCH**
*Templeton, Kenly & Co., Chicago
Jas H. Channon Mfg. Co., Chicago
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Kalamazoo Fdry. & Mach. Co., Kalamazoo, Mich.
- BRANDING TOOLS**
Everhot Mfg. Co., Maywood, Ill.
- BRASS GOODS**
Chase Brass & Copper Co., Inc., Waterbury, Conn.
Glauber Brass Mfg. Co., Cleveland, Ohio
Haydenville Co., Haydenville, Mass.
Hays Mfg. Co., Erie, Pa.
Mueller Company, Decatur, Ill.
Union Water Meter Co., Worcester, Mass.
United-Obendorf Corp., Cleveland, Ohio
- BREAKERS, CONCRETE**
*McKiernan-Terry Corp., New York
*Independent Pa. Tool Co., Chicago
*Sullivan Machy. Co., Chicago
Chicago Pneumatic Tool Co., N. Y.
Cleveland Pneumatic Tool Co., Cleveland
Cleveland Rock Drill Co., Cleveland
Gardner-Denver Co., Quincy, Ill.
Gilman Mfg. Co., E. Boston, Mass.
Hardsocg Wonder Drill Co., Ottumwa, Iowa
Ingersoll-Rand Co., New York
Milwaukee Gas Tool Co., Milwaukee
Schramm, Inc., West Chester, Pa.
- BRICK, PAVING (See Paving Brick)**
- BRIDGE FLOORS**
*Armco Culvert Mfrs. Assn., Middletown, O.
*Servicised Premoulded Products, Chicago
American Bridge Co., N. Y.
W. R. Meadows, Inc., Elgin, Ill.
Wyckoff Pipe & Creos. Co., New York
- BRIDGES AND BUILDINGS, STEEL**
Missouri Vv. Br. & Ir. Co., Leavenworth, Kas.
Mt. Vernon Br. Co., Mt. Vernon, Ohio
Bellevue Br. & Stl. Co., Bellefontaine, O.
Bethlehem Steel Co., Bethlehem, Pa.
Butler Mfg. Co., Minneapolis, Minn.
Central States Br. Co., Indianapolis, Ind.
Champion Bridge Co., Wilmington, Ohio
Chesapeake Iron Works, Baltimore, Md.
Clinton Bridge Works, Clinton, Iowa
Eastern Bridge & Struc. Co., Worcester, Mass.
Flour City Orn. Iron Co., Minneapolis
Fort Pitt Br. Works, Pittsburgh, Pa.
Ingalls Iron Works Co., Birmingham, Ala.
Inter. Steel & Iron Co., Evansville, Ind.
Lakeside Br. & St. Co., No. Milwaukee
Louisville Br. & Iron Co., Louisville, Ky.
McClintie Marshall Co., Pittsburgh, Pa.
Milwaukee Br. Co., Milwaukee, Wis.
Minneapolis-Moline Power Impl. Co., Minneapolis
Penn Bridge Co., Beaver Falls, Pa.
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Richmond Struc. Stl. Co., Richmond, Va.
James B. Seaverns Co., Batavia, Ill.
Virginia Br. & Ir. Co., Roanoke, Va.
Wisc. Br. & Ir. Co., No. Milwaukee, Wis.
Vogt Mch. Co., Inc., Louisville, Ky.
Wheeling Struc. Stl. Co., Wheeling, W. Va.
- BROOMS (See Street Sweeping Brooms)**
- BUCKETS, AUTOMATIC DUMPING**
*Lakewood Eng. Co., Cleveland, O.
*Union Iron Wks., Inc., Hoboken, N. J.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
- BUCKETS, CLAM SHELL**
*Blaw-Knox Co., Pittsburgh, Pa.
*Erie Steel Const. Co., Erie, Pa.
*Hayward Co., N. Y.
*Industrial Brownhoist Corp., Cleveland
*Lakewood Eng. Co., Cleveland, Ohio
- BUCKETS, CONCRETE**
*Insley Mfg. Co., Indianapolis, Ind.
*Jaeger Mach. Co., Columbus, O.
*Lakewood Eng. Co., Cleveland, Ohio
*Bansome Conc. Mch. Co., Dunellen, N. J.
*Union Iron Works, Inc., Hoboken, N. J.
Norry K. Davis, San Francisco, Calif.
Koppel Ind. Car & Equip. Co., Koppel, Pa.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
- BUCKETS, DRAGLINE**
*Blaw-Knox Co., Pittsburgh, Pa.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*Hayward Co., New York
*Sauerman Bros., Chicago
*Schofield-Burkett Constr. Co., Macon, Ga.
*G. H. Williams Co., Erie, Pa.
Beaumont Mfg. Co., Philadelphia
Harnischfeger Corp., Milwaukee
Link-Belt Co., Chicago
Monaghan Mfg. Corp., Chicago
- BUCKETS, DREDGING AND EXCAVATING**
*Blaw-Knox Co., Pittsburgh, Pa.
*Erie Steel Const. Co., Erie, Pa.
*Hayward Co., N. Y.
*Industrial Brownhoist Corp., Cleveland
*Lakewood Eng. Co., Cleveland, Ohio
*Manitowoc Eng'g Wks., Manitowoc, Wis.
*G. H. Williams Co., Erie, Pa.
Browning Crane Co., Cleveland
Geo. Hais Mfg. Co., New York
Link-Belt Co., Chicago
Mead-Morrison Mfg. Co., E. Boston, Mass.
Orton Crane & Shovel Co., Chicago
Owen Bucket Co., Cleveland, Ohio
Stockton Iron Wks., Stockton, Cal.
- BUCKETS, ORANGE PEEL**
*Hayward Co., N. Y.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Mead-Morrison Mfg. Co., E. Boston, Mass.
Orton Crane & Shovel Co., Chicago
- BUILDING FORMS (See Forms, Conc.)**
- BUILDINGS, STEEL (See Bridges)**
- BULLDOZERS**
*Baker Mfg. Co., Springfield, Ill.
*Euclid Crane & Hoist Co., Euclid, Ohio
*Traxcon Co., Milwaukee, Wis.
*W-K-M Co., Houston, Tex.
LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, Ohio
- BUNKS AND COTS**
Pt. Pitt Bedding Co., Pittsburgh, Pa.
Haggard & Marcellon Co., Chicago
Southern Rome Co., Baltimore, Md.
- CABLES (See Wire and Cable)**
- CABLEWAYS, DRAGLINE**
*A. Flory Mfg. Co., Bangor, Pa.
*McKiernan-Terry Corp., New York
*Sauerman Bros., Chicago
*Schofield-Burkett Constr. Co., Macon, Ga.
*Street Bros. Mach. Works, Chattanooga
Beaumont Mfg. Co., Philadelphia
L. P. Green, Chicago
Link-Belt Co., Chicago
Mead-Morrison Mfg. Co., E. Boston, Mass.
- CARS FOR MOTOR TRUCKS**
Highland Body Mfg. Co., Cincinnati, Ohio
Weatherproof Body Corp., Corunna, Mich.
- CAISSONS**
American Bridge Co., N. Y.
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Ir. Wks. Co., Sharon, Pa.
- CALCIUM CHLORIDE FOR ROADS**
*Columbia Products Co., Barborton, O.
*Dow Chemical Co., Midland, Mich.
*Solway Sales Corp., New York
- CANS FOR GARBAGE AND REFUSE**
American Can Co., N. Y.
Durlach Can & Iron Wks., Brooklyn, N. Y.
Reeves Mfg. Co., Dover, Ohio
Rochester Can Co., Rochester, N. Y.
Solar-Sturges Mfg. Co., Melrose Pk., Ill.
Witt Cornice Co., Cincinnati, Ohio
Wyatt Metal & Boiler Wks., Dallas, Tex.
- CANVAS & BURLAP**
Fulton Bag & Cotton Mills, Atlanta, Ga.
- CAR UNLOADERS (See Loaders)**
- CARS, INDUSTRIAL V. DUMPING**
*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Eng. Co., Cleveland, Ohio
Atlas Car & Mfg. Co., Cleveland, Ohio
Austin Mfg. Co., Chicago
Case Crane & Engg. Co., Columbus, O.
Chase Fdry. & Mfg. Co., Columbus, Ohio
Easton Car & Const. Co., Easton, Pa.
C. W. Hunt Co., W. New Brighton, N. Y.
Koppel Ind. Car & Equip. Co., Koppel, Pa.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
United Ir. Wks., Inc., Kansas City, Mo.
Weller Mfg. Co., Chicago
Whiting Corp., Harvey, Ill.
- CARTS, CONCRETE**
*General Wheelbarrow Co., Cleveland, Ohio
*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Eng. Co., Cleveland, Ohio
*Lansing Co., Lansing, Mich.
*Ransome Conc. Mch. Co., Dunellen, N. J.
Acme Rd. Machy. Co., Frankfort, N. Y.
Case Crane & Eng. Co., Columbus, O.
Chattanooga Wheelbarrow Co., Chatta., Tenn.
Cleveland Wheelbarrow Co., Cleveland, Ohio
Easton Car & Const. Co., Easton, Pa.
Gray Iron Fdry. Co., Reading, Pa.
Jackson Mfg. Co., Harrisburg, Pa.
Lee Trailer & Body Co., Plymouth, Ind.
Sterling Wheelbarrow Co., Milwaukee
Toledo Wheelbarrow Co., Toledo, Ohio
- CAST IRON PIPE (See Pipe, Cast Iron)**
- CASTINGS, STEEL**
*Brown Clutch Co., Sandusky, Ohio
Farrell-Cheek Steel Fdry. Co., Sandusky, Ohio
Wheeling Mold & Fdry. Co., Wheeling, W. Va.
- CASTINGS, STREET AND SEWER**
*Central Fdry. Co., N. Y.
*U. S. Pipe & Fdry. Co., Burlington, N. J.
Canton Fdry. & Mach. Co., Canton, Ohio
H. W. Clark Co., Mattoon, Ill.
Clarksville Fdry. & Mach. Co., Clarksville, Tenn.
J. B. Clow & Sons, Chicago
W. E. Dea Co., Chicago
Donley Bros. Co., Cleveland
Elkhart Fdry. & Mach. Co., Elkhart, Ind.
Int'l. Comb. Eng. Co., Aberdeen, S. Dak.
Klauser Mfg. Co., Dubuque, Iowa
Madison Fdry. Co., Cleveland, Ohio
Niles Machine Co., Lebanon, N. H.
Fechstein Iron Works, Keokuk, Iowa
Sessions Foundry Co., Bristol, Conn.
South Bend Fdry. Co., So. Bend, Ind.
- CATCH BASINS (See Castings, Street)**
- CATCH BASIN CLEANING OUTFITS**
Atlas Sales Corp., New York
Elgin Corp., N. Y.
Mack Trucks, Inc., N. Y.
- CAULKING COMPOUNDS**
*Servicised Premoulded Products, Chicago
*Standard Oil Co. of Indiana, Chicago
*Standard Oil Co. of N. Y., New York
Headley Emulsified Prod. Co., Phila. Texas Co., New York
- CAULKING MACHINERY AND TOOLS**
*Independent Pa. Tool Co., Chicago
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Co., New York
Mueller Company, Decatur, Ill.
- CEMENT—(P. C. stands for Portland Cement)**
*Columbia Cem. Div. of Pittsburgh Plate Glass Co., Pittsburgh
*Universal Atlas Cement Co., Chicago
Acme Cement Corp., Catskill, N. Y.
Aetna P. C. Co., Detroit, Mich.
Allentown P. C. Co., Catsanquas, Pa.
Alpha P. C. Co., Easton, Pa.
Ash Grove Lime & P. C. Co., Kansas City, Mo.
Atlas P. C. Co., N. Y.
Beaver P. C. Co., Portland, Ore.
Bessemer Limestone & C. Co., Youngstown, O.
British Col. Cement Co., Victoria, B. C.
Canada Cement Co., Ltd., Montreal, Canada
Colorado P. C. Co., Denver, Colo.
Consolidated Cement Corp., Chicago
Cowell P. C. Co., Cowell, Cal.
Crescent P. C. Co., Wampum, Pa.
Dewey P. C. Co., Kansas City, Mo.
Diamond P. C. Co., Cleveland, Ohio
Edison P. C. Co., N. Y.
Georgia Cement & Stone Co., Birmingham, Ala.
Giant P. C. Co., Philadelphia, Pa.
Glens Falls P. C. Co., Glens Falls, N. Y.
Golden State P. C. Co., Los Angeles, Cal.
Great West'n. P. C. Co., Kansas City, Mo.
Hawkeye P. C. Co., Des Moines, Iowa
Hercules Cement Corp., Philadelphia
Hermitage P. C. Co., Nashville, Tenn.
Huron P. C. Co., Detroit, Mich.
International Cement Corp., N. Y.
International P. C. Co., Ltd., Spokane, Wash.
Kosmos P. C. Co., Louisville, Ky.
La Tolteca Compania de Cemento Portland Mexico City, Mex.
Lawrence Cement Co., New York
Lehigh P. C. Co., Allentown, Pa.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



The all-around strength of the General Concrete Cart is illustrated by its axle, which is guaranteed unconditionally against breaking or bending. It is made of alloy steel, heat treated and temper drawn to a tremendous degree of toughness. It can't even wear, because of General's renewable steel bushing, a feature to be found on no other concrete buggy.

This steel bushing is renewable. It takes all the wear. You may have to replace the bushing, but the axle will never wear out.

Never Before Such a Concrete Cart

HERE'S a Concrete Cart designed—wheels, axles, hopper, every detail—to haul concrete easily, quickly, conveniently, day in and day out for years. That's the General Concrete Cart. Look carefully at the illustration. See the strong pulling loop—you do not have to punch holes in the hopper to tie a chain to it. Hopper is flanged and arc welded. Removable axle housing and the strongest axle ever put in a concrete cart.

Strong beyond any ordinary requirement; designed and perfectly balanced for speed, here is a concrete cart that begins doing a full job the minute you get it and keeps right on doing it. Write for folder giving complete details of our exclusive design and construction.

GENERAL WHEELBARROW COMPANY

Associated Companies:

General Wheelbarrow Company The Empire Plow Company

Headquarters for Wheelbarrows, Concrete Carts, Steel Mortar Boxes, Salamanders, Coal Chutes, Agricultural Implements, Plow Shapes, Scrapers, Road Grader Blades.

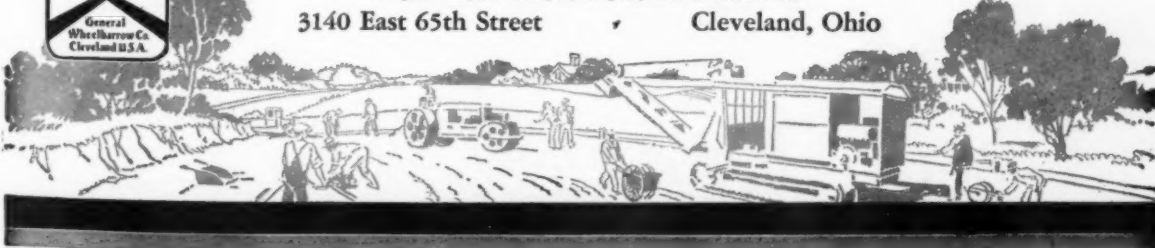
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Empire ROAD GRADER BLADES

The same specialized strength runs through all General Contractor Equipment and General Highway Equipment. Empire Road Grader Blades, now sold through General distributors, are made of a new special steel which has all the resistance to abrasion of plow steel. They are accurately curved to cut clean and hold their edge. Write for full details.



Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.

WHERE TO PURCHASE

CEMENT (Continued)

Louisville Cement Co., Louisville, Ky.
 Manitowoc P. C. Co., Manitowoc, Wis.
 Marlboro Cement Co., Edmonton, Can.
 Marquette Cement Mfg. Co., Chicago
 Missouri P. C. Co., St. Louis, Mo.
 Monarch Cement Co., Humboldt, Kans.
 Monolith P. C. Co., Los Angeles, Cal.
 National Cement Co., Birmingham, Ala.
 Nasareth Cement Co., Nasareth, Pa.
 Nebraska Cement Co., Denver, Colo.
 Newago P. C. Co., Newago, Mich.
 New Egyptian P. C. Co., Detroit
 North Amer. Cement Corp., Albany, N. Y.
 Northwestern States P. C. Co., Mason City, Ia.
 Oklahoma P. C. Co., Denver
 Olympic P. C. Co., Seattle
 Oregon P. C. Co., Portland, Ore.
 Pacific P. C. Co., San Francisco
 Peerless P. C. Co., Detroit, Mich.
 Peninsular P. C. Co., Cement City, Mich.
 Penn.-Allen Cement Co., Nasareth, Pa.
 Pennsylvania-Dixie Cement Corp., N. Y.
 Petoskey P. C. Co., Petoskey, Mich.
 Phoenix P. C. Co., Philadelphia
 P. C. Co. of Utah, Salt Lake City
 Pyramid P. C. Co., Des Moines
 Riverside P. C. Co., Los Angeles
 St. Marys Cement Co., Toronto, Can.
 San Antonio P. C. Co., San Antonio
 Sandusky Cement Co., Cleveland, Ohio
 Santa Cruz P. C. Co., San Francisco
 Signal Mountain P. C. Co., Chatto, Tenn.
 Southern States P. C. Co., Rockport, Ga.
 Southwestern P. C. Co., Los Angeles, Cal.
 Standard P. C. Co., Cleveland
 Sun P. C. Co., Portland, Ore.
 Superior P. C. Co., Seattle, Wash.
 Three Forks P. C. Co., Denver, Colo.
 Tidewater P. C. Co., Baltimore, Md.
 Trinity P. C. Co., Dallas, Tex.
 Union P. C. Co., Denver, Colo.
 U. S. P. C. Co., Denver, Colo.
 Utah Idaho Cement Co., Ogden, Utah
 Vulcanite P. C. Co., Philadelphia
 Wabash P. C. Co., Detroit
 Warrior Cement Corp., Chatto, Tenn.
 Wellston Iron Furnace Co., Jackson, Ohio
 Wolverine P. C. Co., Coldwater, Mich.
 Wyandotte P. C. Co., Detroit

CEMENT BLOCK MACHINES

Abrams Cement Tool Co., Detroit, Mich.
 Cement Block Machy. Co., Newark, N. J.
 J. B. Foote Fdry. Co., Fredericktown, O.
 Keglmeier Cast Stone Block Machy. Co., Bay City, Mich.

CEMENT SPRAYERS OR GUNS

Cement-Gun Co., Allentown, Pa.
 Macleod Co., Cincinnati

CEMENT INSPECTION (See Inspecting Laboratories)

CEMENT TOOLS

Abrams Cement Tool Co., Detroit
 American Fork & Hoe Co., Cleveland

CENTRIFUGAL PUMPS (See Pumps, Centrifugal)

CHAINS

*Chain Belt Co., Milwaukee, Wis.
 Amer. Chain Co., Inc., Bridgeport, Conn.
 Baldwin Chain & Mfg. Co., Worcester, Mass.
 Columbus McKinnon Chain Corp., Tonawanda, N. Y.
 Diamond Chain & Mfg. Co., Indianapolis, Ind.
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago
 U. S. Chain & Forge Co., Pittsburgh, Pa.
 Webster Mfg. Co., Chicago
 Weller Mfg. Co., Chicago

CHIMNEYS, CONCRETE

Helme Chimney Co., Chicago
 H. R. Heinicke, Inc., Indianapolis, Ind.
 Rust Engineering Co., Pittsburgh, Pa.
 Weber Chimney Co., Chicago

CHIMNEYS, RADIAL BRICK

Amer. Chimney Corp., N. Y.
 Continental Chimney Co. of Chicago, Chicago
 Alphons Custodis Chimney Const. Co., N. Y.
 Helme Chimney Co., Chicago
 H. R. Heinicke, Inc., Indianapolis, Ind.
 M. W. Kellogg & Co., N. Y.
 Rust Engineering Co., Pittsburgh, Pa.

CHIMNEYS, STEEL (See Stacks, Steel)

CHISELS, CHIPPING

Cleveland Steel Tool Co., Cleveland, Ohio
 Verona Tool Wks., Verona, Pa.

CHLORINATORS

*Wallace & Tiernan Co., Inc., Newark, N. J.
 Paragon Mfg. Co., Arlington, N. J.

CHLORINE, LIQUID

(See Liquid Chlorine)

CHUTES, CONCRETE

*Insley Mfg. Co., Indianapolis, Ind.
 *Lakewood Eng. Co., Cleveland, Ohio
 *Ransome Conc. Mch. Co., Dunellen, N. J.
 Archer Iron Works, Chicago

CLAMPS & TIES, FORM

*Insley Mfg. Co., Indianapolis
 American Form-Hold Corp., Culver City, Cal.
 Batavia Clamp Co., Inc., Batavia, N. Y.
 Black Bros. Co., Mendota, Ill.
 Concrete Form Tie Corp., Pittsburgh, Pa.
 Easy-Set Wall Tie Co., Dayton, O.
 W. A. Kuhlman & Co., Toledo
 M. & M. Wire Clamp Co., Minneapolis
 James L. Taylor Mfg. Co., Poughkeepsie, N. Y.
 Universal Form Clamp Co., Chicago
 Wedgit Tie Co., Inc., New York

CLAMPS, COLUMN

*Ellis & Ford Mfg. Co., Detroit, Mich.
 *Insley Mfg. Co., Indianapolis, Ind.
 Black Bros. Co., Mendota, Ill.
 Concrete Eng. Co., Omaha, Neb.
 Handy Mfg. Co., Chicago
 Kardong Bros., Inc., Minneapolis
 W. A. Kuhlman & Co., Toledo, Ohio
 M. & M. Wire Clamp Co., Minneapolis
 The O. D. G. Co., Owensboro, Ky.
 J. E. Porter Corp., Ottawa, Ill.
 H. W. Ross Co., Cincinnati
 Steelform Contracting Co., San Francisco
 Sterling Wheelbarrow Co., Milwaukee
 Symons Clamp & Mfg. Co., Chicago
 James L. Taylor Mfg. Co., Poughkeepsie, N. Y.
 Universal Form Clamp Co., Chicago
 Wedgit Tie Co., Inc., New York

CLAY DIGGERS, PNEUMATIC

*Buckeye Traction Ditcher Co., Findlay, O.
 *Independent Pn. Tool Co., Chicago
 *Sullivan Machy. Co., Chicago
 Chicago Pneumatic Tool Co., New York
 Cleveland Rock Drill Co., Cleveland
 Gardner-Denver Co., Quincy, Ill.
 Ingersoll-Rand Co., New York
 Schramm, Inc., West Chester, Pa.

CLAY PIPE

(See Pipe, Vitrified Clay)

CLIPS, WIRE ROPE

*Amer. Steel & Wire Co., Chicago
 Amer. Hoist & Derrick Co., St. Paul, Minn.
 Fischer & Hayes Rope & Steel Co., Chicago
 Hazard Wire Rope Co., Wilkes-Barre, Pa.
 Thos. Laughlin Co., Portland, Me.
 Marion Malleable Iron Works, Marion, Ind.
 C. M. Mockbee Co., Cincinnati, Ohio
 John A. Roebling Sons Co., Trenton, N. J.
 Upson-Walton Co., Cleveland, Ohio

CLUTCHES

*Brown Clutch Co., Sandusky, Ohio
 *O. K. Clutch & Mach'y. Co., Columbia, Pa.
 *Twin Disc Clutch Co., Racine, Wis.
 *Waukesha Motor Co., Waukesha, Wis.
 Brown-Lipe Gear Co., Syracuse, N. Y.
 Link-Belt Co., Chicago

COCKS, CURB AND CORPORATION

Chapman Valve Mfg. Co., Indian Orch'd, Mass.
 Glauher Brass Mfg. Co., Cleveland, Ohio
 Haydenville Co., Haydenville, Mass.
 Hays Mfg. Co., Erie, Pa.
 Mueller Co., Decatur, Ill.
 Union Water Meter Co., Worcester, Mass.

COMPRESSORS, AIR (See Air Compressors)

CONCRETE BLOCK MACHINES (See Cement Block Machines)

CONCRETE CURING

*Acqua-Proof, Inc., New York
 *Columbia Prod. Co., Barberton, O.
 *Dow Chemical Co., Midland, Mich.
 *McEverlast, Inc., Los Angeles, Calif.
 *Solvay Sales Corp., New York
 Barber Asphalt Co., Philadelphia

CONCRETE HEATERS

*Chausse Oil Burner Co., Elkhardt, Ind.
 *Connerly & Co., Philadelphia, Pa.
 *Littleford Bros., Cincinnati
 Astrol Burner Co., West New York, N. J.
 Hauck Mfg. Co., Brooklyn, N. Y.
 Alex. Milburn Co., Baltimore, Md.

CONCRETE MIXERS

*Chain Belt Co., Milwaukee, Wis.
 *Jaeger Mach. Co., Columbus, Ohio
 *Koehring Co., Milwaukee, Wis.
 *Kwik-Mix Concrete Mixer Co., Port Washington, Wis.
 *Lakewood Eng. Co., Cleveland, Ohio
 *Lansing Co., Lansing, Mich.
 *John Lauson Mfg. Co., New Holstein, Wis.
 *Ransome Conc. Mch. Co., Dunellen, N. J.

*Republic Iron Wks., Tecumseh, Mich.

*T. L. Smith Co., Milwaukee
 Acme Rd. Machy. Co., Frankfort, N. Y.
 Amer. Cem. Mch. Co., Inc., Keokuk, Iowa
 Anchor Mfg. Co., Chicago
 Archer Iron Works, Chicago
 Atlas Engineering Co., Clintonville, Wis.
 Badger Con. Mixer Co., Milwaukee
 Construction Mch. Co., Waterloo, Iowa
 Norris K. Davis, San Francisco, Calif.
 J. B. Foote Fdry. Co., Fredericktown, Ohio
 Gray Iron Fdry. Co., Reading, Pa.
 Judy Mfg. Co., Centerville, Iowa
 Knickerbocker Co., Jackson, Mich.
 Leach Co., Oshkosh, Wis.
 Orr & Sembower, Reading, Pa.
 Rummel Mfg. Co., Kewaskum, Wis.

CONCRETE PAVERS (See Pavers, Concrete)

CONCRETE PILING (See Piling)

CONCRETE PIPE (See Pipe, Concrete)

CONCRETE PLACERS, PNEUMATIC

*Ransome Concrete Machy. Co., Dunellen, N. J.
 Cement-Gun Co., Inc., Allentown, Pa.
 Macleod Co., Cincinnati

CONCRETE REINFORCEMENT

*American Steel & Wire Co., Chicago
 *Truscon Steel Co., Youngstown, Ohio
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie Steel Co., Pittsburgh, Pa.
 Concrete Steel Co., N. Y.
 Consolidated Exp. Metal Co., Wheeling, W. Va.
 Electric Welding Co., Pittsburgh, Pa.
 Ft. Pitt Bridge Works, Pittsburgh, Pa.
 Genfire Steel Co., Youngstown, Ohio
 Inland Steel Co., Chicago
 Kaiman Steel Co., Chicago
 Laclede Steel Co., St. Louis, Mo.
 National Steel Fabric Co., Pittsburgh
 Republic Iron & Steel Co., Youngstown, Ohio
 J. T. Ryerson & Son, Chicago
 Sweet's Steel Co., Williamsport, Pa.
 Wickwire-Spencer Steel Co., N. Y.
 Youngstown Pressed Steel Co., Warren, Ohio

CONCRETE ROAD FINISHERS

*Blaw-Knox Co., Pittsburgh, Pa.
 *A. W. French & Co., Chicago
 *Heltzel Steel Form & Iron Co., Warren, Ohio
 *Lakewood Eng. Co., Cleveland, Ohio

CONDENSERS

*Allis-Chalmers Mfg. Co., Milwaukee
 Ingersoll-Rand Co., N. Y.
 Sangamo Elec. Co., Springfield, Ill.
 Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
 Worthington Pump & Machy. Corp., N. Y.
 Young Radiator Co., Racine, Wis.

CONDUIT RODS

Turbine Sewer Mch. Co., Milwaukee
 Waldo Bros. & Bond Co., Boston
 Westinghouse Elec. Sup. Co., F. Bissell Div., Toledo

CONDUITS, UNDERGROUND

Amer. Vitr. Products Co., Akron, Ohio
 Johns-Manville, Inc., N. Y.
 National Fireproofing Co., N. Y.
 Pensacola Creosoting Co., Pensacola, Fla.
 Ric-wil Co., Cleveland
 Wyckoff Pipe & Creosoting Co., New York

CONTRACTORS' EQUIPMENT DEALERS (See Pages 143-170)

CONVEYORS, BELT

*Austin-Western Rd. Mch. Co., Chicago
 *Barber-Greene Co., Aurora, Ill.
 *The Burch Corp., Crestline, Ohio
 *Chain Belt Co., Milwaukee, Wis.
 *Chicago Automatic Conv. Co., Chicago
 *Conveying Weigher Co., New York
 *Good Rds. Mch. Co., Kennett Sq., Pa.
 *Jos. Honhorst Co., Cincinnati
 *Industrial Brownhoist Corp., Cleveland
 Austin Mfg. Co., Chicago
 Atlas Engineering Co., Clintonville, Wis.
 C. O. Bartlett & Snow Co., Cleveland
 H. W. Caldwell & Son, Chicago
 Cincinnati Rubber Mfg. Co., Cincinnati
 Cyclone Fence Co., Waukegan, Ill.
 Fairfield Engineering Co., Marion, Ohio
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Geo. Haiss Mfg. Co., New York
 Jeffrey Mfg. Co., Columbus, Ohio
 Lamson Co., Syracuse, N. Y.
 Link-Belt Co., Chicago
 New Holland Mach. Co., N. Holland, Pa.
 Northern Conveyor Co., Janesville, Wis.
 Samuel Olson & Co., Chicago
 Fortable Machinery Co., Clifton, N. J.
 Robins Conv. Belt Co., N. Y.
 Jas. B. Seavers Co., Batavia, Ill.
 Smith Eng. Wks., Milwaukee
 Standard Conv. Co., No. St. Paul, Minn.



**Building a levee on the Mississippi River at Pecan Point, Arkansas (S. A. Hunter Co.)*

Cutting **TIME** and **COSTS** with **"Caterpillars"***

BIG WAGONS to make the most of the traction and power of the "Caterpillar" Sixty Tractor. One man operates the tractor and dumps the wagons. Bigger tools, heavier scarifiers, stout graders! It takes power to win contracts (and profits)—much of the finest equipment today available has been designed for use with "Caterpillar."

Caterpillar Tractor Co.

PEORIA, ILLINOIS and SAN LEANDRO, CALIFORNIA, U. S. A.

Track-type Tractors ✓ Combines ✓ Road Machinery

(There's a "Caterpillar" Dealer Near You)

Prices—f. o. b. Peoria, Illinois

TEN \$1100 TWENTY . . . \$1900

FIFTEEN . . \$1450 THIRTY . . . \$2375

SIXTY \$4175

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REG. U. S. PAT. OFF.
TRACTOR

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.

WHERE TO PURCHASE

CONVEYORS, BELT—(Continued)

Stephens-Adams Mfg. Co., Aurora, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

CONVEYORS, BUCKET

*Chain Belt Co., Milwaukee, Wis.
Chicago Automatic Conv. Co., Chicago
*Conveying Weigher Co., N. Y.
*Good Roads Machy. Co., Kennett Sq., Pa.
*Jos. Honhorst Co., Cincinnati, Ohio
*Industrial Brownhoist Corp., Cleveland
*New England Road Machy. Co., So. Boston.
Atlas Engineering Co., Clintonville, Wis.
Anstis Mfg. Co., Chicago
C. O. Bartlett & Snow Co., Cleveland, Ohio
H. W. Caldwell & Son, Chicago
Fairfield Engineering Co., Marion, Ohio
Gifford-Wood Co., Hudson, N. Y.
Godfrey Conv. Co., Elkhart, Ind.
Guarantee Constn. Co., N. Y.
Geo. Haisa Mfg. Co., New York
Jeffrey Mfg. Co., Columbus, Ohio
Lamson Co., Syracuse, N. Y.
Link-Belt Co., Chicago
Mead-Morrison Mfg. Co., E. Boston, Mass.
New Holland Mach. Co., N. Holland, Pa.
Republic Rubber Co., Youngstown, Ohio
Jas. B. Seaverus Co., Batavia, Ill.
Stephens-Adams Mfg. Co., Aurora, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

CONVEYORS, GRAVITY

Lamson Co., Syracuse, N. Y.
Legan Co., Louisville, Ky.
Mathews Conveyor Co., Elwood City, Pa.
Samuel Olson & Co., Chicago
Standard Conv. Co., No. St. Paul, Minn.

COUPLINGS, HOSE, AIR AND WATER

*C. B. Hunt & Son, Salem, O.
*Independent Pneumatic Tool Co., Chicago
Cleveland Pneum. Tool Co., Cleveland, Ohio
Gilman Mfg. Co., East Boston, Mass.
Ingersoll-Rand Co., N. Y.
W. H. Keller, Inc., Grand Haven, Mich.
Mulcairey Co., Philadelphia

CRANES, CRAWLER

*Bay City Shovels, Inc., Bay City, Mich.
*Buckeye Traction Ditcher Co., Findlay, O.
*General Excavator Co., Marion, Ohio
*Industrial Brownhoist Corp., Cleveland
*Manitowoc Engr. Works, Manitowoc, Wis.
*Osgood Company, Marion, Ohio
*Thew Shovel Co., Lorain, Ohio
*Trackson Co., Milwaukee
*Universal Crane Co., Lorain, Ohio
*W-K-M Co., Houston, Tex.
Browning Crane Co., Cleveland
Bucyrus-Erie Co., Erie, Pa.
Byers Mach. Co., Ravenna, O.
Link-Belt Co., Chicago
McMyler Interstate Co., Cleveland
Mead-Morrison Mfg. Co., E. Boston
Northwest Eng. Wks., Chicago
Ohio Loc. Crane Co., Bucyrus, Ohio
Ohio Power Shovel Co., Lima, O.
Orton Crane & Shovel Co., Chicago
Otis Eng. Co., Brooklyn, N. Y.
Star Drilling Mach. Co., Akron, Ohio
Sterling Tractor Equipment Co., New York

CRANES, LOCOMOTIVE

*Industrial Brownhoist Corp., Cleveland
*Koeberling Co., Milwaukee
*Osgood Company, Marion, Ohio
*Parsons Co., Newton, Iowa
*Speeder Mch. Corp., Cedar Rapids, Iowa
*Thew Shovel Co., Lorain, Ohio
Amer. Hat & Derrick Co., St. Paul, Minn.
Browning Crane Co., Cleveland, Ohio
Bucyrus-Erie Co., Erie, Pa.
Link-Belt Co., Chicago
Loc. Crane Co. of Amer., Champaign, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Eng. Works, Chicago
Ohio Loc. Crane Co., Bucyrus, Ohio
Orton Crane & Shovel Co., Chicago

CRANES, ONE-TON

*Hughes-Keenan Co., Mansfield, Ohio
Clark Tractor Co., Battle Creek, Mich.
Whitehead & Kales Co., Detroit, Mich.

CRANES, OVERHEAD TRAVELING

*Erie Steel Const'n Co., Erie, Pa.
Alliance Mach. Co., Alliance, O.
Chesapeake Iron Wks., Baltimore, Md.
Chisholm-Moore Mfg. Co., Cleveland
Curtis Pn. Mch. Co., St. Louis
Harnischfeger Corp., Milwaukee, Wis.
Milwaukee Elec. Crane Co., Milwaukee
Morgan Eng. Co., Alliance, O.
Northern Eng. Wks., Detroit, Mich.
Shaw Crane Wks., Muskegon, Mich.
Shepard Elec. Cr. & Hat. Co., Montour Falls, N. Y.
Toledo Crane Co., Bucyrus, O.
Whiting Corp., Harvey, Ill.

CRANES, TRUCK

*Universal Crane Co., Lorain, Ohio
Atia Sales Corp., New York
Bay City Fdry. & Mach. Co., Bay City, Mich.
Browning Crane Co., Cleveland
Erated Mfg. Co., Portland, Ore.
Harnischfeger Corp., Milwaukee, Wis.
Orton Crane & Shovel Co., Chicago

CRANES, WRECKING

*Industrial Brownhoist Corp., Cleveland
Bucyrus-Erie Co., Erie, Pa.
Industrial Wks., Bay City, Mich.

CRAWLER ATTACHMENTS

*W. A. Biddell Co., Bucyrus, O.
*Trackson Co., Milwaukee, Wis.
Belle City Mfg. Co., Racine, Wis.
Geo. Haisa Mfg. Co., New York
Link-Belt Co., Chicago

CRESOATED BLOCKS, TIMBER, ETC.

Amer. Cresos. Co., Inc., Louisville, Ky.
Amer. Cresos. Wks., Inc., New Orleans, La.
Ayer & Lord Tie Co., Chicago
Carter Bloxomend Flooring Co., K. City, Mo.
Colonial Cre. Co., Inc., Louisville, Ky.
Compressed Wood Preserv. Co., Cincinnati, O.
Cresos. Materials Co., New Orleans, La.
Georgia Cresos. Co., Louisville, Ky.
Jennison-Wright Co., Toledo, O.
Long Bell Lumber Co., Kansas City, Mo.
Midland Cresos. Co., Granite City, Ill.
Pensacola Cresoing Co., Pensacola, Fla.
Republic Cresos. Co., Indianapolis, Ind.
Southern Wood Pres. Co., Atlanta, Ga.
Wyckoff Pipe & Cresos. Co., N. Y.

CRUSHERS, ROCK

*Allis-Chalmers Mfg. Co., Springfield, Ill.
*Austin-Western Rd. Mach. Co., Chicago
*Good Rds. Machy. Co., Kennett Sq., Pa.
*New England Road Machy. Co., So. Boston.
*W-K-M Co., Houston, Tex.
Acme Rd. Machy. Co., Frankfort, N. Y.
Austin Mfg. Co., Chicago
Gallion Jr. Wks. & Mfg. Co., Gallion, O.
New Holland Mach. Co., New Holland, Pa.
Russell Grader Mfg. Co., Minneapolis
Smith Eng. Wks., Milwaukee
Sturtevant Mill Co., Boston
Universal Crusher Co., Cedar Rapids, Ia.
Universal Rd. Machy. Co., Kingston, N. Y.
Western Wheeled Scraper Co., Aurora, Ill.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

CULVERTS, CAST IRON

*U. S. Pipe & Fdry. Co., Burlington, N. J.
American Casting Co., Birmingham, Ala.
Beach Mfg. Co., Charlotte, Mich.
Gallion Iron Wks. & Mfg. Co., Gallion, O.
R. D. Wood & Co., Philadelphia
CULVERTS, CORRUGATED METAL
*Armco Culvert Mfrs. Assn., Middletown, O.
*Austin-Western Rd. Mach. Co., Chicago
*Gohi Culvert Mfrs., Inc., Newport, Ky.
*Good Rds. Mach. Co., Kennett Sq., Pa.
American Casting Co., Birmingham, Ala.
Austin Mfg. Co., Chicago
Bark River Bridge & Culv. Co., Bark River, Mich.
Beach Mfg. Co., Charlotte, Mich.
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
Berger Mfg. Co., Jacksonville, Fla.
Boardman Co., Okla. City, Okla.
Burnham Mfg. Co., Woods Cross, Utah
Calif. Corr. Culv. Co., W. Berkeley, Cal.
Canada Ingot Ir. Co., Ltd., Guelph, Ont.
Canton Culv. & Silo Co., Canton, O.
Decatur Cornice & Roofing Co., Albany, Ala.
Dixie Culv. & Metal Co., Atlanta, Ga.
Dixie Culv. Mfg. Co., Little Rock, Ark.
Edwards Mfg. Co., Cincinnati
Gallion Iron Wks. & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
R. Hardesty Mfg. Co., Denver, Colo.
Highway Prod. & Mfg. Co., Elmira, N. Y.
Ind. Corr. Culv. Co., Mason City, Ia.
Iowa Pure Ir. Co., Des Moines, Ia.
Kentucky Culvert Mfg. Co., Louisville, Ky.
Klauer Mfg. Co., Dubuque, Ia.
Lyle Culv. & Pipe Co., Minneapolis
Md. Culv. & Metal Co., Baltimore
Missouri Pure Iron Co., Moberly, Mo.
Nebraska Culv. & Mfg. Co., Wahoo, Neb.
N. E. Metal Culv. Co., Palmer, Mass.
New England Metal Culvert Co., Nashua, N. H.
Newport Culvert Co., Newport, Ky.
Northfield Ir. Co., Northfield, Minn.
Northwest'n. Sheet & Ir. Wks., Wahpeton, N. D.
Ohio Corr. Culv. Co., Middletown, O.
W. G. O'Neill Co., Crawfordsville, Ind.
Pure Iron Culvert & Mfg. Co., Portland, Ore.
Road Supply & Metal Co., Topeka, Kan.
St. Paul Corr. Co., St. Paul, Minn.
Sioux Falls Metal Culv. Co., Sioux Falls, S. D.
So. Metal Culv. Co., Salisbury, N. C.
Spokane Culv. & Tank Co., Spokane, Wash.
Tenn. Metal Culv. Co., Nashville
Union Iron Prod. Co., E. Chicago, Ind.

U. S. Br. & Culv. Co., Bay City, Mich.
Virginia Culvert Corp., Richmond, Va.
Western Metal Mfg. Co., Houston, Tex.
Wheeling Corr. Co., Wheeling, W. Va.
Wyatt Metal & Br. Wks., Dallas, Tex.

CULVERT FORMS

*Blaw-Knox Company, Pittsburgh, Pa.
*Heltzel Steel Form & Iron Co., Warren, O.
Concrete Form Co., Inc., Watertown, N. Y.
Northfield Iron Co., Northfield, Minn.

CURE BOXES

*Central Foundry Co., New York
H. W. Clark Co., Mattson, Ill.
J. B. Clow & Sons, Chicago
Columbian Iron Wks., Chattanooga, Tenn.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Madison Fdry Co., Cleveland, O.
Mueller Co., Decatur, Ill.
J. S. Schofield's Sons Co., Macon, Ga.
R. D. Wood & Co., Philadelphia, Pa.

CURE, GUTTER AND BASE FORMS (See Forms, Concrete)

CURE GUARDS, STEEL

W. S. Godwin Co., Baltimore

CURE, STEEL PROTECTED

*Truscon Steel Co., Youngstown, O.
Concrete Steel Co., N. Y.

CURING OF CONCRETE

*Acqua-Proof, Inc., New York
*Columbia Prod. Co., Barberton, O.
*Dow Chemical Co., Midland, Mich.
*McEverlast, Inc., Los Angeles, Calif.
*Solvay Sales Corp., N. Y.
Barber Asphalt Co., Philadelphia

CUTTERS, PIPE, HAND

*Ellis & Ford Mfg. Co., Detroit
Armstrong Mfg. Co., Bridgeport, Ct.
Barnes Tool Co., New Haven, Ct.
Erie Tool Works, Erie, Pa.
Greenfield Tap & Tie Corp., Greenfield, Mass.
Oswego Tool Co., Oswego, N. Y.
Reed Mfg. Co., Erie, Pa.
Walworth Co., Boston

CUTTERS, ROD AND WIRE

*Koeberling Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carolina Mfg. Co., Sterling, Ill.
Helwig Mfg. Co., St. Paul, Minn.
M. & M. Wire Clamp Co., Minneapolis
Morse-Starrett Prod. Co., Oakland, Calif.

CUTTING EDGES

*Caterpillar Tractor Co., San Leandro, Cal.
*General Wheelbarrow Co., Cleveland
J. D. Adams Co., Indianapolis, Ind.
Shank Mfg. Co., Bucyrus, O.

CUTTING AND WELDING APPARATUS (See Welding Apparatus)

CYLINDER HEADS, RICARDO

*Waukesha Motor Co., Waukesha, Wis.

DERRICKS, GUY AND STIFF-LEG

*Clyde Jr. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*S. Flory Mfg. Co., Bangor, Pa.
*Insley Mfg. Co., Indianapolis, Ind.
*J. S. Mundy Htg. Engine Co., Newark, N. J.
*Saggen Derrick Co., Chicago
*Street Bros. Mach. Works, Chattanooga
Amer. Hat & Derrick Co., St. Paul, Minn.
Superior Iron Wks., Superior, Wis.

DERRICKS, PIPE LAYING

*Dobbie Fdry. & Mach. Co., Niagara Falls
*Saggen Derrick Co., Chicago
*Street Bros. Mach. Works, Chattanooga
*W-K-M Co., Houston, Tex.
Lidgerwood Mfg. Co., Elizabeth, N. J.

DERRICKS, REVOLVING

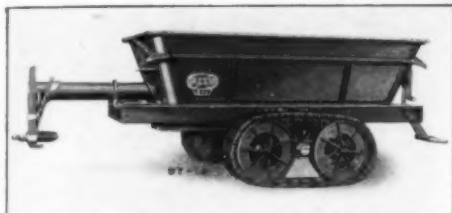
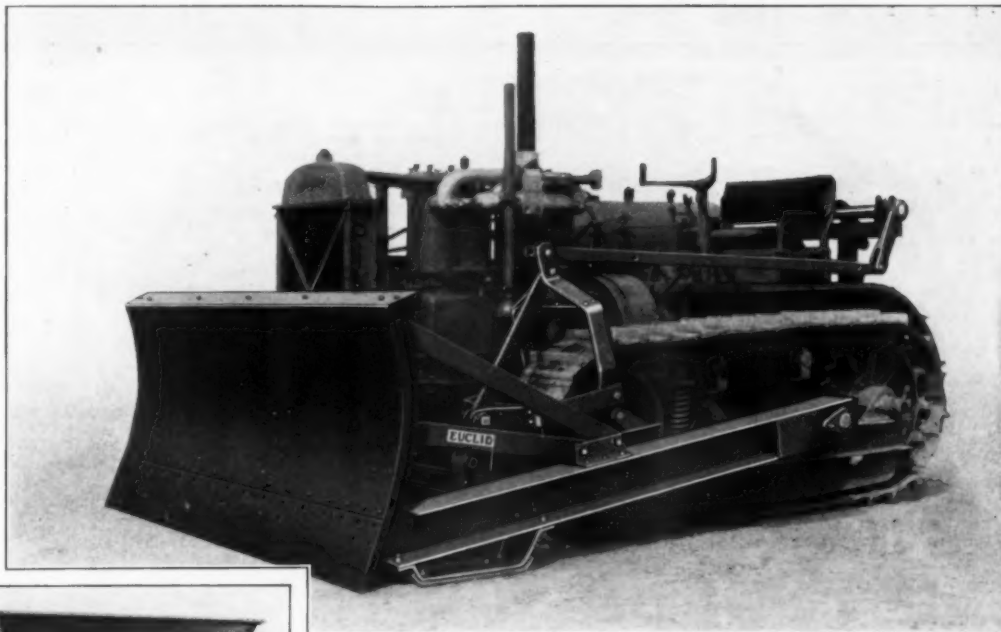
*Clyde Jr. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls
*Street Bros. Mach. Works, Chattanooga

DERRICKS, STEEL

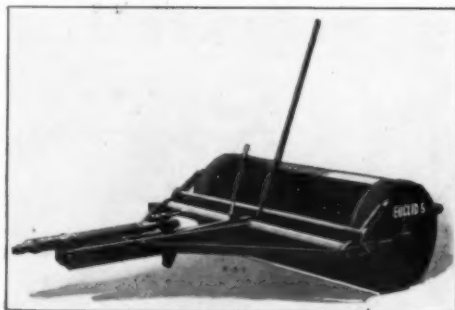
*Clyde Jr. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls
*Hayward Co., N. Y.
*Insley Mfg. Co., Indianapolis, Ind.
*Saggen Derrick Co., Chicago
*Street Bros. Mach. Works, Chattanooga
Amer. Hat & Derrick Co., St. Paul
Taylor Port. St. Derrick Co., Chicago

DERRICKS, STEEL PORTABLE

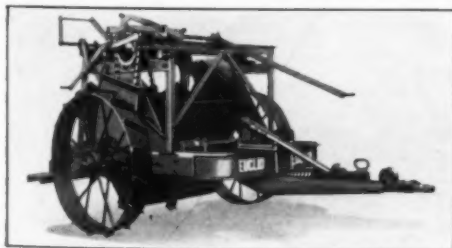
*Clyde Jr. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls
*Street Bros. Mach. Works, Chattanooga
Amer. Hat & Derrick Co., St. Paul
Lidgerwood Mfg. Co., Elizabeth, N. J.



EUCLID "Track-Wheel" Wagon



EUCLID Rotary Scraper



EUCLID Wheel Scraper

EUCLID

adds another
labor saver
The BULLDOZER

ONE of the most recent additions to Euclid's fast expanding line of earth moving equipment is the Euclid Hydraulic Operated Bulldozer.

Adapted primarily for use with the "Caterpillar" Sixty and Thirty is proving unusually valuable to earth moving contractors on all Bulldozing work. Simplicity, ease of operation, light weight yet built unusually strong, embodying engineered construction features including the Euclid specially designed hydraulic pump and lifting jack.

Hydraulic in operation with complete control within easy reach of the tractor driver—is easily installed on the tractor—leaves an exceptionally heavy drawbar free, at all times, for other uses.

Get the facts on this husky, dependable unit bearing the Euclid name. Write us direct or get in touch with one of our local representatives.

There is a Dealer near you.

Manufacturers of

Euclid "Track-Wheel" Bottom Dump, Gravity Rear End Dump, Hydraulic Rear End Dump, Log and Pipe Wagons—Bulldozers—Wheel and Rotary Scrapers.

Manufactured by
THE EUCLID CRANE & HOIST CO.
ROAD MACHINERY DIVISION

EUCLID

OHIO

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.

WHERE TO PURCHASE . . .

DERRICK FITTINGS

- *S. Flory Mfg. Co., Bangor, Pa.
- *Hayward Co., N. Y.
- *J. S. Mundy Hstg. Engine Co., Newark, N. J.
- *Saagen Derrick Co., Chicago
- *Street Bros. Mach. Works, Chattanooga
- Amer. Hst. & Derrick Co., St. Paul
- Buffalo Hoist & Derrick Co., Buffalo, N. Y.
- Lidgerwood Mfg. Co., Elizabeth, N. J.

DIESEL PUMPING OUTFITS

- *O. H. & E. Mfg. Co., Milwaukee, Wis.
- *Chain Belt Co., Milwaukee, Wis.
- *Jaeger Mach. Co., Columbus, O.
- *John Lauson Mfg. Co., New Holstein, Wis.
- *Novo Engine Co., Lansing, Mich.
- *Tool & Device Corp., Waterford, N. Y.
- Humphreys Mfg. Co., Mansfield, O.

DIESEL ENGINES (See Engines, Oil)

DISTRIBUTORS, TAR AND ASPHALT

- *Chain Belt Co., Milwaukee, Wis.
- *E. D. Etnyre & Co., Oregon, Ill.
- *Good Roads Machinery Co., Kennett Sq., Pa.
- *Chas. Hyatt & Co., New York
- Kinney Mfg. Co., Boston
- Municipal Supply Co., So. Bend, Ind.

DISTRIBUTING PLANTS, CONCRETE

- *Insley Mfg. Co., Indianapolis, Ind.
- *Jaeger Mach. Co., Columbus, O.
- *Lakewood Eng. Co., Cleveland, O.
- *Ransome Conc. Mch. Co., Dunellen, N. J.
- Archer Iron Works, Chicago

DITCHING MACHINES (See Excavators)

DOORS AND SHUTTERS, STEEL ROLLING

- Cornell Iron Wks., L. I. City, N. Y.
- Edwards Mfg. Co., Cincinnati, O.
- Holzer Sheet Metal Works, New Orleans, La.
- Kinnear Mfg. Co., Columbus, O.
- James Peters & Son, Philadelphia
- St. Paul Corrugating Co., St. Paul, Minn.
- Variety Rolling Door Co., Westerville, O.
- Wheeling Struc. Stl. Co., Wheeling, W. Va.
- J. G. Wilson Corp., N. Y.

DRAWS, ROAD

- *Austin-Western Road Machinery Co., Chicago
- *Caterpillar Tractor Co., San Leandro, Calif.
- *General Wheelbarrow Co., Cleveland
- *Good Roads Machy. Co., Kennett Square, Pa.
- Acme Road Machy. Co., Frankfort, N. Y.
- J. D. Adams Co., Indianapolis, Ind.
- American Steel Scraper Co., Sidney, Ohio
- Beach Mfg. Co., Charlotte, Mich.
- Case Crane & Eng. Co., Columbus, O.
- Chatta. Wheelbarrow Co., Chattanooga, Tenn.
- Deere & Co., Moline, Ill.
- Donaldson Bros. Mt. Clemens, Mich.
- Gallon Iron Works & Mfg. Co., Gallon, O.
- Jackson Mfg. Co., Harrisburg, Pa.
- Miskin Scraper Wks., Ucon, Idaho
- Ryan Mfg. Corp., Chicago
- Sidney Steel Scraper Co., Sidney, O.
- Blusser-McLean Scraper Co., Sidney, Ohio
- Stockland Road Machinery Co., Minneapolis
- Toledo Wheelbarrow Co., Toledo
- Western Wheeled Scraper Co., Aurora, Ill.

DRAWING IRKS (Waterproof)

- *Falcon Works, Gunther Wagner, New York
- Chas. M. Higgins & Co., Brooklyn, N. Y.
- F. Weber Co., Philadelphia

DRAWING INSTRUMENTS AND SUPPLIES

(See Instruments and Supplies)

DREDGES

- *Bay City Shovels, Inc., Bay City, Mich.
- *Ellicott Machy Corp., Baltimore
- *Hayward Co., N. Y.
- *Osgood Company, Marion, Ohio
- *Street Bros. Mach. Works, Chattanooga
- Amer. Steel Dredge Co., Ft. Wayne, Ind.
- Bucyrus-Erie Co., Erie, Pa.
- Marion Steam Shovel Co., Marion, O.
- Orton Crane & Shovel Co., Chicago
- J. S. Schofield's Sons Co., Macon, Ga.
- Stockton Iron Wks., Stockton, Cal.
- Superior Iron Wks., Superior, Wis.

DREDGES DIPPER

- *Bay City Shovels, Inc., Bay City, Mich.
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *Osgood Company, Marion, Ohio
- Amer. Steel Dredge Co., Ft. Wayne, Ind.
- Bucyrus-Erie Co., Erie, Pa.
- Link-Belt Co., Chicago
- Marion Steam Shovel Co., Marion, O.

DREDGES, HYDRAULIC

- *Ellicott Machy Corp., Baltimore
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- Amer. Steel Dredge Co., Fort Wayne, Ind.
- Bucyrus-Erie Co., Erie, Pa.
- Morris Mach. Wks., Baldwinville, N. Y.

DREDGING MACHINERY

- *S. Flory Mfg. Co., Bangor, Pa.
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *J. S. Mundy Hstg. Engine Co., Newark, N. J.
- *Street Bros. Mach. Works, Chattanooga
- Johnson Mfg. Co., Seattle, Wash.
- Lidgerwood Mfg. Co., Elizabeth, N. J.

DRILL STEEL (See Steel Drills, Hollow)

DRILL STEEL SHARPENERS (See Sharpeners)

DRILLS, CORE

- *McKiernan-Terry Corp., N. Y.
- *Sanderson-Cyclone Drill Co., Orrville, O.
- *Sullivan Machy. Co., Chicago
- Ingersoll-Rand Co., N. Y.

DRILLS, ELECTRIC

- *Independent Pneum. Tool Co., Chicago
- Black & Decker Mfg. Co., Towson, Baltimore, Md.
- Van Dorn Iron Wks. Co., Cleveland
- Wappat Gear Wks., Pittsburgh

DRILLS, ROCK

- *The Buhl Company, Chicago
- *Loomis Machine Co., Tiffin, Ohio
- *Sanderson-Cyclone Drill Co., Orrville, O.
- *Sullivan Machy. Co., Chicago
- Chicago Pneumatic Tool Co., New York
- Cleveland Pneum. Tool Co., Cleveland, O.
- Cleveland Rock Drill Co., Cleveland, O.
- Dalzell Co., Philadelphia
- Gardner-Denver Co., Quincy, Ill.
- Gilman Mfg. Co., E. Boston
- Hardacoe Wonder Drill Co., Ottumwa, Ia.
- Helwig Mfg. Co., St. Paul, Minn.
- Ingersoll-Rand Co., New York
- W. H. Keller, Inc., Grand Haven, Mich.
- Schramm, Inc., West Chester, Pa.
- Warwood Tool Co., Wheeling, W. Va.
- Wood Drill Wks., Paterson, N. J.

DRILLS FOR WELLS AND BLAST HOLES

(See Well Drilling Machy.)

DRUMS, HOLDING

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Clyde Ir. Wks. Sales Co., Duluth, Minn.
- *Dobbie & Ryer, Mach. Co., Niagara Falls
- *Hayward Co., New York
- *Heltsel Steel Form & Ir. Co., Warren, O.
- *Street Bros. Mach. Works, Chattanooga

DYERS, ASPHALT AND CEMENT

- *Allis-Chalmers Mfg. Co., Milwaukee
- *F. D. Cummer & Son Co., Cleveland
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- Amer. Blower Co., Detroit, Mich.
- Atlas Dryer Co., Cleveland, O.
- G. O. Bartlett & Snow Co., Cleveland, O.
- Lancaster Iron Works, Inc., Lancaster, Pa.
- Ruggles-Coles Engineering Co., New York

DYERS, SAND AND GRAVEL

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Jos. Honhorst Co., Cincinnati, O.
- *Littleford Bros., Cincinnati, O.
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- Aeroli Burner Co., West New York, N. J.
- C. O. Bartlett & Snow Co., Cleveland, O.
- Macleod Co., Cincinnati
- Merriman Asph. Plant, Lima, O.
- Alex. Milburn Co., Baltimore, Md.

DUMP BODIES FOR CONCRETE

- American Cement Mach. Co., Keokuk, Ia.
- Easton Car & Const. Co., Easton, Pa.
- Lee Trailer & Body Co., Plymouth, Ind.

DUMP BODIES FOR MOTOR TRUCKS

- *Columbian St. Tank Co., Kansas City, Mo.
- *Highway Trailer Co., Edgerton, Wis.
- *Hughes-Keenan Co., Mansfield, O.
- *N. F. Nelson Iron Wks., Passaic, N. J.
- Amer. Prod. & Trd. Co., Chicago
- Am. Truck Body Co., Martinsville, Va.
- Anthony Co., Streator, Ill.
- Atlas Sales Corp., New York
- C. O. Bartlett & Snow Co., Cleveland
- Columbia Body Corp., Columbia, Pa.
- Detroit Trailer & Mach. Co., Detroit
- Ditwiler Mfg. Co., Gallon, O.
- Eagle Wagon Wks., Auburn, N. Y.
- Easton Car & Const. Co., Easton, Pa.
- Gallon All Steel Body Co., Gallon, O.
- Hell Co., Milwaukee
- Herr Dump Car Mfg. Co., Coatesville, Pa.
- The Hug Co., Highland, Ill.
- Jennings Aut. Dump Body, Roanoke, Va.
- Lee Trailer & Body Co., Plymouth, Ind.
- Mack Trucks, Inc., N. Y.
- Mandt Body Co., Keokuk, Ia.
- Marion Steel Body Co., Marion, O.
- Martin-Parry Corp., York, Pa.
- N. Y. Central Ir. Wks., Hagerstown, Md.
- Pechstein Iron Wks., Keokuk, Ia.
- Stewart Iron Wks. Co., Cincinnati
- Van Dorn Iron Wks. Co., Cleveland, O.

DUMP CARTS AND WAGONS, HORSE

- *Austin-Western Road Machy. Co., Chicago
- *Caterpillar Tractor Co., San Leandro, Calif.
- *Electric Wheel Co., Quincy, Ill.
- *Highway Trailer Co., Edgerton, Wis.
- *Chas. Hyatt & Co., New York
- Acme Road Machy. Co., Frankfort, N. Y.
- Acme Wagon Co., Emigville, Pa.
- J. D. Adams Co., Indianapolis
- Austin Mfg. Co., Chicago
- Columbia Body Corp., Columbia, Pa.
- Eagle Wagon Wks., Auburn, N. Y.
- Gilbert Mfg. Co., Stillwater, Minn.
- G. H. Holzbog & Bro., Jeffersonville, Ind.
- Little Red Wagon Co., Omaha, Neb.
- Luedinghaus-Eschenchied Wagon Co., St. Louis
- Smith Trailer Co., Syracuse, N. Y.
- Stockland Road Machinery Co., Minneapolis
- Streich Bros., Oshkosh, Wis.
- Troy Trailer & Wagon Co., Troy, O.
- Western Wheeled Scraper Co., Aurora, Ill.

DUMP WAGONS (ALL STEEL), TRACTOR

- *Davenport Loco. & Mfg. Corp., Davenport, Ia.
- *Electric Wheel Co., Quincy, Ill.
- *Euclid Crane & Hoist Co., Euclid, O.
- LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa
- Smith Trailer Co., Syracuse, N. Y.
- Trail-IT Co., St. Paul, Minn.

DYNAMITE (See Explosives)

EARTH-BORING EQUIPMENT

- *Highway Trailer Co., Edgerton, Wis.
- *Loomis Machine Co., Tiffin, O.
- *W.K.M. Co., Houston, Tex.
- App Tunnelling Machine Co., N. Y.

EJECTORS, SEWAGE (See Sewage Ejectors)

ELECTRIC GENERATORS AND MOTORS

- *Allis-Chalmers Mfg. Co., Milwaukee
- American Motors Co., Cedarburg, Wis.
- The Louis Allis Co., Milwaukee
- Century Electric Co., St. Louis
- Crocker-Wheeler Co., Amper, N. J.
- Fairbanks, Morse & Co., Chicago
- General Electric Co., Schenectady, N. Y.
- Graybar Electric Co., New York
- Idea Electric & Mfg. Co., Mansfield, O.
- Lincoln Electric Co., Cleveland, O.
- Northwestern Mfg. Co., Milwaukee, Wis.
- Robbins & Myers Co., Springfield, O.
- Wagner Electric Mfg. Co., St. Louis
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC LAMPS

- General Electric Co., Schenectady, N. Y.
- Westinghouse Lamp Co., N. Y.

ELECTRIC LIGHTING PLANTS

- *Allis-Chalmers Mfg. Co., Milwaukee
- *Homelite Corp., Port Chester, N. Y.
- *Novo Engine Co., Lansing, Mich.
- Climax Eng. Co., Clinton, Iowa
- Cook Motor Co., Delaware, O.
- Cushman Motor Works, Lincoln, Neb.
- Fairbanks, Morse & Co., Chicago
- Fuller & Johnson Mfg. Co., Madison, Wis.
- General Electric Co., Schenectady, N. Y.
- Klauser Mfg. Co., Dubuque, Iowa
- Kohler Co., Kohler, Wis.
- Sunbeam Electric Mfg. Co., Evansville, Ind.
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC TRANSFORMERS

- *Allis-Chalmers Mfg. Co., Milwaukee
- General Electric Co., Schenectady, N. Y.
- Kuhlman Electric Co., Bay City, Mich.
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC WIRES (See Wire)

ELEVATORS, BUCKET

- *Austin-Western Rd. Machy. Co., Chicago
- *Chain Belt Co., Milwaukee, Wis.
- *Conveying Weigher Co., N. Y.
- *Good Rds. Machy. Co., Kennett Sq., Pa.
- *Industrial Brownhoist Corp., Cleveland
- *New England Road Machy. Co., So. Boston
- Atlas Engineering Co., Clintonville, Wis.
- Austin Mfg. Co., Chicago
- C. O. Bartlett & Snow Co., Cleveland, O.
- H. W. Caldwell & Son, Chicago
- Fairfield Engineering Co., Marion, Ohio
- Gifford Wood Co., Hudson, N. Y.
- Geo. Haiss Mfg. Co., New York
- Headrick Mfg. Co., Carbondale, Pa.
- Jeffrey Mfg. Co., Columbus, O.
- Link-Belt Co., Chicago
- New Holland Mch. Co., N. Holland, Pa.
- Robins Conveying Belt Co., N. Y.
- Smith Engg. Wks., Milwaukee
- Spears-Wells Machy. Co., Oakland, Cal.
- Stephens-Adams Mfg. Co., Aurora, Ill.
- Univ. Rd. Machy. Co., Kingston, N. Y.
- Webster Mfg. Co., Chicago
- Weiler Mfg. Co., Chicago

WHEN CLAMSHELL BUCKETS ARE UNDER CONSIDERATION

November 27, 1929
 Blaw-Knox Company
 Box 915
 Pittsburgh, Pa.
 Gentlemen:

We have your favor of the 25th in regard to the Blaw-Knox buckets we bought from you. We consider the Blaw-Knox the best bucket by far on today's market. It not only is a better digger, which is the chief use of a bucket, but outlasts anything we have yet had. We would not consider any other bucket for future purchases.

Yours very faithfully,
**STANDARD WHOLESALE PHOSPHATE
 & ACID WORKS, Inc.**
 (Signed) George A. Whiting,
 PRESIDENT

The two letters shown here are typical of hundreds in our file endorsing the efficient, thrifty performance of Blaw-Knox Ball Bearing Buckets. They are the choice of users who want top-notch performance with economy. Catalog 1059 fully illustrates clamshells for every class of service. May we send it to you?

November 27th, 1929

Blaw-Knox Company,
 P. O. Box No. 915,
 Pittsburgh, Penna.

Gentlemen:

We have had one of your extra wide re-handling buckets of 2 cubic yards capacity for about 6 months. It has given every indication of handling more material during the course of a day than any other bucket we have ever used, picking up more than 2 yards at every bite.

It therefore gives us pleasure to heartily recommend this bucket as being most economical and efficient.

You may give anyone in the market for buckets our whole hearty indorsement.

Yours very truly,

SUPER CONCRETE CORP.

(Signed) H. B. Graham,
 VICE-PRES.



BLAW-KNOX COMPANY
 2067 Farmers Bank Building, Pittsburgh, Pa.
 Offices and Representatives in all principal cities

BLAW-KNOX

WHERE TO PURCHASE

ELEVATORS, PASSENGER, FREIGHT, ETC.

Am. Elev. & Mach. Co., Louisville, Ky.
 Atlantic Elev. Co., Inc., Philadelphia
 Bay State Elev. Co., Springfield, Mass.
 Consolidated Steel Co., Los Angeles
 Haughton Elev. & Mach. Co., Toledo, O.
 Montgomery Elevator Co., Moline, Ill.
 Otis Elevator Co., N. Y.
 O. Ridgway & Son Co., Coatesville, Pa.
 A. B. See Electric Elevator Co., N. Y.
 Spindel Elevator Corp., Reading, Pa.
 Warner Elevator Mfg. Co., Cincinnati
 Warsaw Elevator Co., Warsaw, N. Y.
 Westinghouse Elec. Elevator Co., E. Pitts-
 burgh, Pa.

ENGINES, DREDGING

Murray Iron Works Co., Burlington, Ia.

ENGINES, GAS AND GASOLINE

*Allis-Chalmers Mfg. Co., Milwaukee
 Caterpillar Tractor Co., San Leandro, Cal.
 Continental Motors Corp., Muskegon, Mich.
 Domestic Eng. & Pump Co., Shippensburg, Pa.
 Electric Wheel Co., Quincy, Ill.
 Hercules Motors Corp., Canton, O.
 International Harvester Co., Chicago
 John Lauson Mfg. Co., New Holstein, Wis.
 Le Roi Co., Milwaukee
 Novo Engine Co., Lansing, Mich.
 Stover Mfg. & Eng. Co., Freeport, Ill.
 Waukesha Motor Co., Waukesha, Wis.
 Wisconsin Motor Co., Milwaukee
 Beaver Mfg. Co., Milwaukee
 Buda Co., Harvey, Ill.
 Charter Gas Engine Co., Sterling, Ill.
 Climax Engineering Co., Clinton, Ia.
 Cook Motor Co., Delaware, O.
 Cushman Motor Works, Lincoln, Neb.
 Evinrude Div., Outboard Motors Corp., Mil-
 waukee
 Fairbanks Morse & Co., Chicago
 Foss Gas Engine Co., Springfield, O.
 Fuller & Johnson Mfg. Co., Madison, Wis.
 Hinkley Motors, Inc., Detroit
 F. Van Rossum Hoogendyk, New York
 Indian Motorcycle Co., Springfield, Mass.
 Ingersoll-Rand Co., New York
 Minneapolis-Moline Power Impl. Co., Minne-
 apolis, Minn.
 Serval Mfg. Co., Evansville, Ind.
 Sterling Engine Co., Buffalo, N. Y.
 Universal Motor Co., Oshkosh, Wis.
 Weber Engine Co., Kansas City, Mo.
 Witte Engine Works, Kansas City, Mo.

ENGINES, HOISTING (See Hoists)

ENGINES, INDUSTRIAL (See Power Plants, Industrial)

ENGINES, KEROSENE

*Electric Wheel Co., Quincy, Ill.
 Hercules Motors Corp., Canton, O.
 John Lauson Mfg. Co., New Holstein, Wis.
 Stover Mfg. & Eng. Co., Freeport, Ill.
 Waukesha Motor Co., Waukesha, Wis.
 Climax Engineering Co., Clinton, Ia.
 Fuller & Johnson Mfg. Co., Madison, Wis.
 Witte Engine Works, Kansas City, Mo.

ENGINES, OIL, DIESEL

*Allis-Chalmers Mfg. Co., Milwaukee
 Stover Mfg. & Eng. Co., Freeport, Ill.
 Anderson Engine & Fdry. Co., Anderson, Ind.
 Bessemer Gas Eng. Co., Grove City, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Buckeye Machinery Co., Lima, O.
 Busch-Sulzer Bros.-Diesel Eng. Co., St. Louis
 Charter Gas Engineering Co., Sterling, Ill.
 Chicago Pneumatic Tool Co., New York
 Cummins Eng. Co., Columbus, Ind.
 Fairbanks, Morse & Co., Chicago
 Fulton Iron Works Co., St. Louis
 F. Van Rossum Hoogendyk, New York
 Ingersoll-Rand Co., New York
 Lombard Governor Co., Ashland, Mass.
 McIntosh & Seymour Corp., Auburn, N. Y.
 I. P. Morris & De La Vergne, Inc., Phila.
 Muncie Oil Engine Co., Muncie, Ind.
 New London Ship & Eng. Co., Groton, Ct.
 Nordberg Mfg. Co., Milwaukee, Wis.
 St. Mary's Oil Eng. Co., St. Charles, Mo.
 Taylor Machinery Co., Cleveland, O.
 Weber Engineering Co., Kansas City, Mo.
 Western Machy. Co., Los Angeles, Cal.
 Worthington Pump & Mch. Corp., N. Y.

ENGINES, PUMPING

*Allis-Chalmers Mfg. Co., Milwaukee
 Hercules Motors Corp., Canton, O.
 Novo Engine Co., Lansing, Mich.
 Stover Mfg. Co., Freeport, Ill.
 Waukesha Motor Co., Waukesha, Wis.
 Climax Motor Co., Clinton, Ia.
 Hooven, Owens, Rentschler Co., Hamilton, O.
 Murray Iron Works, Burlington, Ia.

Nordberg Mfg. Co., Milwaukee
 Worthington Pump & Mch. Corp., N. Y.

ENGINES, SWINGING

*Clyde Iron Works Sales Co., Duluth, Minn.
 *McKiernan-Terry Corp., New York
 *J. S. Mundy Hstg. Engine Co., Newark, N. J.
 *Dake Engine Co., Grand Haven, Mich.
 American Hoist & Derrick Co., St. Paul, Minn.
 Lidgerwood Mfg. Co., Elizabeth, N. J.

EXCAVATING MACHINERY (See Names Under Excavators, also Steam Shovels)

EXCAVATORS, CABLEWAY

*Sauerman Bros. Inc., Chicago
 *Schofield-Burkett Constr. Co., Macon, Ga.
 *Street Bros. Mach. Works, Chattanooga
 Beaumont Mfg. Co., Philadelphia
 Ersted Mfg. Co., Portland, Ore.
 Lidgerwood Mfg. Co., Elizabeth, N. J.
 Link-Belt Co., Chicago

EXCAVATORS, CRAWLER TRACTOR

*Buckeye Traction Ditcher Co., Findlay, O.
 *General Excavator Co., Marion, Ohio
 *Industrial Brownhoist Corp., Cleveland
 *Manitowoc Engg. Wks., Manitowoc, Wis.
 *Osgood Company, Marion, Ohio
 *Trackson Co., Milwaukee, Wis.
 *W-K-M Co., Houston, Tex.
 W. M. Blair Mfg. Co., Chicago, Ill.
 Bucyrus-Erie Co., Erie, Pa.
 Byers Machine Co., Ravenna, O.
 Geo. Halsas Mfg. Co., New York
 Harnischfeger Corp., Milwaukee
 Link-Belt Co., Chicago

EXCAVATORS, DITCH AND TRENCH

*Barber-Greene Co., Aurora, Ill.
 *Bay City Shovels, Inc., Bay City, Mich.
 *Buckeye Traction Ditcher Co., Findlay, O.
 *General Excavator Co., Marion, Ohio
 *Hayward Co., New York
 *Industrial Brownhoist Corp., Cleveland
 *Insley Mfg. Co., Indianapolis, Ind.
 *Osgood Company, Marion, Ohio
 *Parsons Co., Newton, Ia.
 *Speeder Mch. Corp., Cedar Rapids, Iowa
 *Street Bros. Mach. Works, Chattanooga
 *Thew Shovel Co., Lorain, O.
 Austin Mach. Corp., Muskegon, Mich.
 Bucyrus-Erie Co., Erie, Pa.
 Byers Machine Co., Ravenna, O.
 Cleveland Trencher Co., Euclid, O.
 Economy Exc. Co., Iowa Falls, Ia.
 Ersted Mfg. Co., Portland, Ore.
 Geo. Halsas Mfg. Co., New York
 Harnischfeger Corp., Milwaukee
 Keystone Driller Co., Beaver Falls, Pa.
 Lidgerwood Mfg. Co., Elizabeth, N. J.
 Link-Belt Co., Chicago
 Marion Steam Shovel Co., Marion, O.
 Monaghan Mfg. Corp., Chicago
 Ohio Power Shovel Co., Lima, Ohio
 Orton Crane & Shovel Co., Chicago
 Owensboro Ditcher & Grader Co., Owens-
 boro, Ky.
 Schramm, Inc., West Chester, Pa.
 Star Drilling Machinery Co., Akron, O.
 Chas. T. Topping Machy. Co., Cleveland, Ohio

EXCAVATORS, DRAG-LINE

*Bay City Shovels, Inc., Bay City, Mich.
 *Buckeye Traction Ditcher Co., Findlay, O.
 *General Excavator Co., Marion, Ohio
 *Hayward Co., New York
 *Industrial Brownhoist Corp., Cleveland
 *Insley Mfg. Co., Indianapolis, Ind.
 *Koehring Co., Milwaukee
 *Manitowoc Engr. Wks., Manitowoc, Wis.
 *Novo Engine Co., Lansing, Mich.
 *Osgood Company, Marion, Ohio
 *Sauerman Bros., Chicago
 *Schofield-Burkett Constr. Co., Macon, Ga.
 *Speeder Mch. Corp., Cedar Rapids, Iowa
 *Street Bros. Mach. Works, Chattanooga
 *Thew Shovel Co., Lorain, O.
 *W-K-M Co., Houston, Tex.
 Amer. Hoist & Derrick Co., St. Paul
 Beaumont Mfg. Co., Philadelphia
 Bucyrus-Erie Co., Erie, Pa.
 Byers Machine Co., Ravenna, O.
 Economy Exc. Co., Iowa Falls, Ia.
 Ersted Mfg. Co., Portland, Ore.
 C. L. Gade, Iowa Falls, Ia.
 L. P. Green, Chicago
 Gallion Iron Wks. & Mfg. Co., Gallion, O.
 Harnischfeger Corp., Milwaukee, Wis.
 Lidgerwood Mfg. Co., Elizabeth, N. J.
 Link-Belt Co., Chicago
 Marion Steam Shovel Co., Marion, O.
 Monaghan Mfg. Corp., Chicago
 Northwest Engg. Wks., Chicago
 Ohio Power Shovel Co., Lima, O.
 Orton Crane & Shovel Co., Chicago
 Page Engineering Co., Chicago
 Star Drilling Machine Co., Akron, O.

EXPANDED METAL

*Truscon Steel Co., Youngstown, O.
 Berger Mfg. Co., Canton, Ohio
 Consolidated Exp. Metal Co., Wheeling, W. Va.
 Decatur Cornice & Roofing Co., Albany, Ala.
 Kalman Steel Co., Chicago
 Northwestern Exp. Metal Co., Chicago
 Wheeling Corrugating Co., Wheeling, W. Va.
 Youngstown Pressed Steel Co., Warren, O.

EXPANSION JOINT MATERIAL

*Barrett Co., New York
 *Colphelt Co., Cleveland
 *Philip Carey Co., Cincinnati, O.
 *Servicised Premoulded Products, Chicago
 *Truscon Steel Co., Youngstown, O.
 Barber Asphalt Co., Philadelphia
 Foster Wheeler Corp., New York
 Johns-Manville Corp., New York
 Kalman Steel Co., Chicago
 W. R. Meadows, Inc., Elgin, Ill.
 Texas Co., New York

EXPLOSIVES

Atlas Powder Co., Wilmington, Del.
 Austin Powder Co., Cleveland, O.
 Egyptian Powder Co., East Alton, Ill.
 E. I. du Pont de Nemours & Co., Wilming-
 ton, Del.
 Equitable Powder Mfg. Co., E. Alton, Ill.
 Giant Powder Co., San Francisco, Cal.
 Hercules Powder Co., Wilmington, Del.
 Ill. Powder Mfg. Co., St. Louis, Mo.
 King Powder Co., Cincinnati, O.
 Union Explosives Co., Clarksburg, W. Va.
 U. S. Powder Co., Terre Haute, Ind.

FENCING

*American Steel & Wire Co., Chicago
 Adrian Wire Fence Co., Adrian, Mich.
 Amer. Fence Const. Co., New York
 Anchor Post Fence Co., New York
 Cyclone Fence Co., Waukegan, Ill.
 Diggins Wire Fence Co., Anderson, Ind.
 Giant Mfg. Co., Council Bluffs, Ia.
 Ind. Steel & Wire Co., Muncie, Ind.
 Interlocking Fence Co., Morton, Ill.
 Keystone Steel & Wire Co., Peoria, Ill.
 Kokomo Steel & Wire Co., Kokomo, Ind.
 Mich. Wire Fence Co., Adrian, Mich.
 Nisselman Bros., Muncie, Ind.
 Page Sil. & Wire Co., Bridgeport, Ct.
 Pittsburgh Steel Co., Pittsburgh, Pa.
 Stewart Jr. Wks. Co., Cincinnati, O.
 Tex. Cyclone Fence Co., Ft. Worth, Tex.
 Van Dorn Iron Works Co., Cleveland, O.
 Wayne Iron Works, Wayne, Pa.
 Wickwire-Spencer Steel Co., New York

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Art Metal Constr. Co., Jamestown, N. Y.
 Berger Mfg. Co., Canton, O.
 Canton Art Metal Co., Canton
 Gen. Fireproofing Co., Youngstown, O.

FILTERS, OIL

S. F. Bowser & Co., Inc., Ft. Wayne, Ind.

FILTERS, WATER

Amer. Water Softener Co., Philadelphia, Pa.
 Graver Corporation, E. Chicago, Ind.
 International Filter Co., Chicago
 Norwood Engineering Co., Florence, Mass.
 Permutit Co., New York
 Roberts Filter Co., Darby, Pa.
 W. B. Scaife & Sons, Pittsburgh, Pa.

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FIRE & POLICE ALARM SYSTEMS

Gamewell Co., Newton Upper Falls, Mass.
 Horn Signal Mfg. Corp., New York
 Sterling Siren Fire Alarm Co., Rochester, N.Y.

FIRE ALARM SIRENS

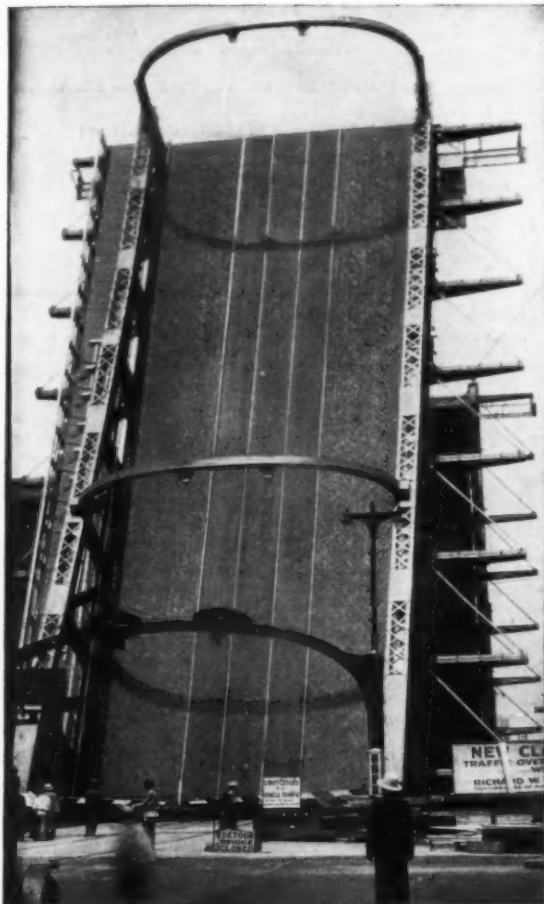
Erick Electric Siren Co., St. Paul, Minn.
 Federal Electric Co., Chicago
 Federal Sign System, Chicago
 Hendrie & Bolthoff Mfg. & Sup. Co., Denver,
 Colo.
 Holtzer-Cabot Electric Co., Boston
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 Union Water Meter Co., Worcester, Mass.

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Ahrens-Fox Fire Eng. Co., Cincinnati, Ohio
 Amer-La France & Foamite Corp., New York
 Boyer Fire Apparatus Co., Logansport, Ind.
 Brockway Motor Fire Apparatus Co., Cor-
 land, N. Y.

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Peter Pirsch & Sons Co., Kenosha, Wis.
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Seagrave Co., Columbus, Ohio
Waterous Fire Eng. Works, St. Paul, Minn.
White Co., Cleveland

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C. J. Cross, New York
Pyrene Mfg. Co., Newark, N. J.

FIRE HOSE (See Hose, Fire)

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Coldwell-Wilcox Co., Newburgh, N. Y.
National Lead Company, New York

FLOOD LIGHTING PROJECTORS

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B. B. T. Corp., Philadelphia, Pa.
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General Electric Co., Schenectady
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Sperry Gyroscope Co., Brooklyn, N. Y.

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Kohler Co., Kohler, Wis.
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Oxweld Acetylene Co., New York
Westinghouse El. & Mfg. Co., E. Pittsburgh, Pa.

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Johns-Manville, Inc., New York
Marine Decking & Sup. Co., Philadelphia, Pa.
Franklyn R. Muller & Co., Waukegan, Ill.

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Long Bell Lumber Co., Kansas City, Mo.
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Republic Creos. Co., Indianapolis, Ind.
Bon. Wood Preserving Co., Atlanta, Ga.
Wyckoff Pipe & Creos. Co., New York

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Pacific Flush Tank Co., Chicago and N. Y.

FLUSHERS, STREET (See Street Flushers and Sprinklers)

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Hauk Mfg. Co., Brooklyn, N. Y.
Mead-Morrison Mfg. Co., E. Boston

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Martin Iron Works, Los Angeles, Cal.
Quinn Wire & Iron Works, Boone, Iowa

FORMS, CONCRETE ROAD

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*Heltzel Stl. Form & Ir. Co., Warren, Ohio
*Lakewood Eng. Co., Cleveland, Ohio
*Truscon Steel Co., Youngstown, Ohio
Hotchkiss Stl. Products Co., Binghamton, N.Y.
Metal Forms Corp., Milwaukee

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Cleveland Trencher Co., Euclid, O.
Metal Forms Corp., Milwaukee

FORMGRADERS

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Int'l Comb. Eng. Corp., Chattanooga, Tenn.
Murdoch Mfg. & Sup. Co., Cincinnati
Puro San. Dr. Ftn. Co., Haydenville, Mass.
Ruddle-Spence Mfg. Co., Milwaukee
Stewart Iron Works Co., Cincinnati, Ohio
Halsey W. Taylor Co., Warren, Ohio
Century Brass Works, Belleville, Ill.

FRESNOES (See Scrapers, Rotary)

GAGES, WATER LEVEL

Bristol Co., Waterbury, Conn.
Builders Iron Foundry, Providence, R. I.
W. & L. E. Gurley, Troy, N. Y.
Lunkenheimer Co., Cincinnati, Ohio

GARBAGE CANS (See Cans)

GARBAGE COLLECTION EQUIPMENT

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Atia Sales Corp., New York
Autocar Company, Ardmore, Pa.
Detroit Trailer & Mach. Co., Detroit
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Hell Co., Milwaukee
Geo. H. Holsborg & Bros., Jeffersonville, Ind.
Lee Trailer & Body Co., Plymouth, Ind.
B. Nicoll & Co., New York
Smith Trailer Co., Syracuse, N. Y.
Troy Trailer & Wagon Co., Troy, Ohio

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Hiller Eng. & Const. Co., Brooklyn, N. Y.
Morse-Boniger Destructor Co., New York
Nye Odorless Incinerator Corp., Albany, Ga.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Superior Incinerator Co. of Dallas, Dallas, Tex.

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Birmingham Tank Co., Birmingham, Ala.
S. F. Bowser & Co., Inc., Ft. Wayne, Ind.
Chicago Bridge & Iron Works, Chicago
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Lancaster Iron Works, Inc., Lancaster, Pa.
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Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
United Iron Works, Inc., Kansas City, Mo.
Wayne Co., Fort Wayne, Ind.

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Cotton Valve Co., Boston, Mass.
Coldwell-Wilcox Co., Newburgh, N. Y.
R. Hardesty Mfg. Co., Denver
Rodney Hunt Machine Co., Orange, Mass.
Ludlow Valve Mfg. Co., Troy, N. Y.

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Wayne Iron Works, Wayne, Pa.

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GRADERS, ROAD (See Road Graders)

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Shunk Mfg. Co., Bucyrus, Ohio

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*Blaw-Knox Co., Pittsburgh
Hendrick Mfg. Co., Carbondale, Pa.

GREASE

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*Jes. Dixon Crucible Co., Jersey City, N. J.

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Robins Conv. Belt Co., New York
Smith Engineering Works, Milwaukee
Stephens-Adamson Mfg. Co., Aurora, Ill.

GROUT MIXERS & PLACERS, PNEUMATIC

*Ransome Concrete Machy. Co., Dunellen, N. J.
Cement-Gun Co., Inc., Allentown, Pa.

GUARD RAIL HIGHWAY

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*Williamsport Wire Rope Co., Williamsport, Pa.
Cyclone Fence Co., Waukegan, Ill.
W. S. Godwin Co., Baltimore, Md.
Hazard Wire Rope Co., Wilkesbarre, Pa.
J. H. Ramsey, Albany, N. Y.
Stewart Iron Works Co., Cincinnati
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HEATING KETTLES (See Kettles)

HITCHES

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*Gustav Schaefer Co., Cleveland, Ohio
Detroit Trailer & Machine Co., Detroit
Trail-IT Co., St. Paul, Minn.
Whitehead & Kales Co., Detroit

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*Brown Clutch Co., Sandusky, Ohio
*Clyde Iron Works Sales Co., Duluth, Minn.
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*Domestic Engine & Pump Co., Shippensburg, Pa.
*J. S. Mundy Hstg. Engine Co., Newark, N. J.
*Novo Engine Co., Lansing, Mich.
*Street Bros. Mach. Works, Chattanooga
American Hoist & Derrick Co., St. Paul, Minn.
Fridy Hoist & Machy. Co., Mountville, Pa.
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*Domestic Eng. & Pump Co., Shippensburg, Pa.
*S. Flory Mfg. Co., Bangor, Pa.
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Fridy Hoist & Machy. Co., Mountville, Pa.
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Harnischfeger Corp., Milwaukee
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Mead-Morrison Mfg. Co., Boston
Northern Engineering Works, Detroit
Orr & Sombower, Reading, Pa.
Robbins & Myers Co., Springfield, O.
Shepard Elec. Crane & Hoist Co., Montour Falls, N. Y.
Sterling Machinery Corp., Kansas City, Mo.
Thomas Elevator Co., Chicago
Treadwell Engineering Co., Easton, Pa.
Universal Hoist & Mfg. Co., Cedar Falls, Iowa
Vulcan Iron Works, Wilkes-Barre, Pa.
Williams Hoist Co., Los Angeles, Calif.

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*Clyde Iron Works Sales Co., Duluth, Minn.
*Dake Engine Co., Grand Haven, Mich.
*Domestic Eng. & Pump Co., Shippensburg, Pa.

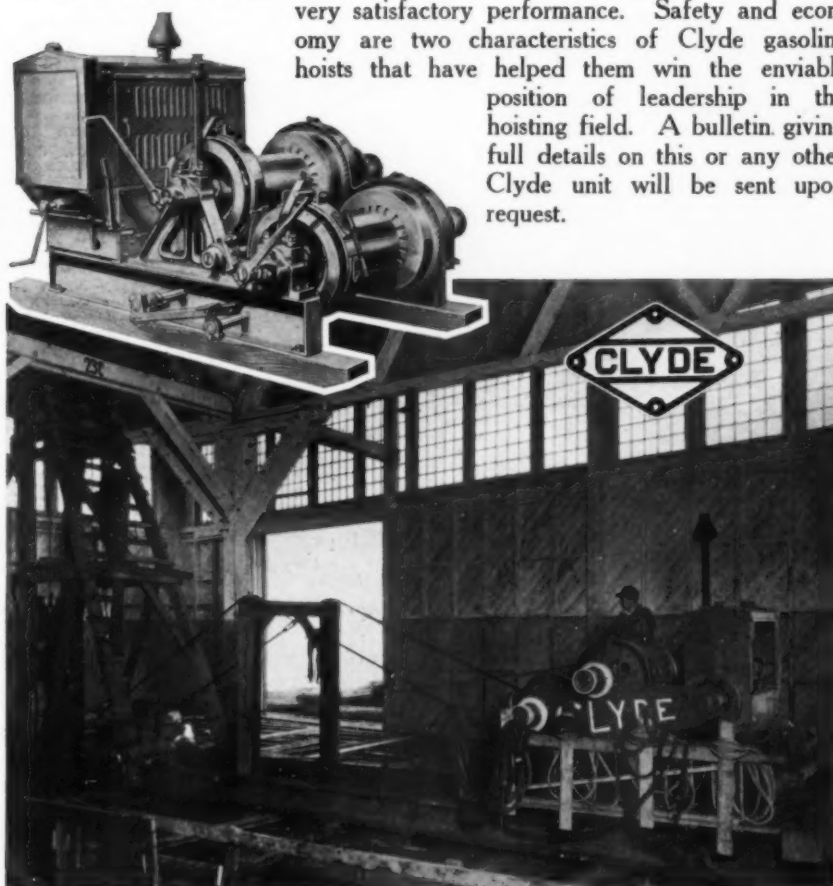
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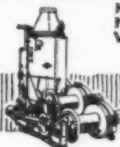
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- Hell Co., Milwaukee
- Joliet Mfg. Co., Joliet, Ill.
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- Cincinnati Rubber Mfg. Co., Cincinnati
- Cleveland Rock Drill Co., Cleveland, Ohio
- The Dallett Co., Philadelphia, Pa.
- Gilman Mfg. Co., East Boston, Mass.
- B. F. Goodrich Rubber Co., Akron
- Goodyear Tire & Rubber Co., Akron, Ohio
- Ingersoll-Rand Co., New York
- Mulconroy Co., Inc., Philadelphia, Pa.
- Penna. Flexible Metallic Tubing Co., Phila., Pa.
- Republic Rubber Co., Youngstown, Ohio
- Schramm, Inc., West Chester, Pa.
- United States Rubber Co., New York

HOSE COUPLINGS (See Couplings, Hose)

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- Kennedy Valve Mfg. Co., Elmira, N. Y.
- Ludlow Valve Mfg. Co., Troy, N. Y.
- Michigan Valve & Fdry Co., Detroit
- Norwood Eng. Co., Florence, Mass.
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- Rife Hydraulic Engine Co., New York
- Rumsey Pump Co., Seneca Falls, N. Y.

IGNITION SYSTEMS

- *Eisemann Magneto Corp., New York
- American Bosch Magneto Corp., Springfield, Mass.
- Dayton Eng. Lab. Co., Dayton, Ohio
- Splitdorf Electric Co., Newark, N. J.

INCINERATORS, GARBAGE (See Garbage Disposal)

INDICATOR POSTS (See Valves)

INSPECTING ENGINEERS

- *W. B. Conard, Burlington, N. J.
- *Fatzig Testing Laboratories, Des Moines, Ia.
- Allentown Testing Laboratory, Allentown, Pa.
- E. L. Conwell & Co., Philadelphia, Pa.
- Gulick-Henderson Co., New York
- Robert W. Hunt Co., Chicago, Ill.
- New York Testing Lab., New York
- Pittsburgh Testing Lab., Pittsburgh

INSTRUMENTS AND SUPPLIES (Surveyors' and Engineers')

- Wm. Ainsworth & Sons, Denver, Col.
- L. Beckman Co., Toledo, Ohio
- C. L. Berger & Sons, Boston
- Brandis & Sons, Inc., Brooklyn, N. Y.
- Buff & Buff Mfg. Co., Boston
- Eugene Dietzgen Co., Chicago
- W. & L. E. Gurley, Troy, N. Y.
- Keuffel & Esser Co., Hoboken, N. J.
- Kolesch & Co., New York
- A. Lietz Co., San Francisco
- Leupold-Volpel & Co., Portland, Ore.
- Luffin Rule Co., Saginaw, Mich.
- L. S. Starratt Co., Athol, Mass.
- Warren-Knight Co., Philadelphia, Pa.
- F. Weber & Co., Philadelphia, Pa.
- David White Co., Milwaukee, Wis.

INTEGRAL CURB AND BASE FORMS (See Forms, Concrete)

IRON WORK, STRUCTURAL AND ORNAMENTAL (See Bridges and Buildings)

JACKS, LIFTING

- *Templeton, Kenly & Co., Chicago
- Duff-Norton Mfg. Co., Pittsburgh, Pa.
- Joyce-Cridland Co., Dayton, Ohio
- Oil Jack Co., Ampere, N. J.
- Rees Mfg. Corp., Pittsburgh, Pa.
- Verona Tool Wks., Verona, Pa.
- Watson-Stillman Company, New York

JACKS, PIPE FORCING

- *Templeton, Kenly & Co., Chicago
- Duff-Norton Mfg. Co., Pittsburgh, Pa.
- Easy Mfg. Co., Lincoln, Neb.

JACKS, PULLER

- *T. H. Edelblute Co., Pittsburgh

JACKS, SCREW

- *Templeton, Kenly & Co., Chicago

JAIL AND PRISON EQUIPMENT

- Fries & Son Steel Const. & Eng. Co., Covington, Ky.
- Manly Jail Works, Dalton, Ga.
- Pauly Jail Building Co., St. Louis, Mo.
- Southern Prison Co., San Antonio, Tex.
- Stewart Iron Works Co., Cincinnati, Ohio
- Van Dorn Iron Works Co., Cleveland.

JOINTS, EXPANSION PAVING (See Expansion Joint Material)

JOINTS, FLEXIBLE PIPE (See Flexible Joints)

JOINT COMPOUND, SEWER PIPE

- *Phillip Carey Co., Cincinnati, Ohio
- *Jos Dixon Crucible Co., Jersey City, N. J.
- Atlas Mineral Prod. Co., Meristown, Pa.
- The Leadite Co., Philadelphia, Pa.
- Pacific Flush Tank Co., Chicago and N. Y.
- Ruberoid Co., New York
- Texas Co., New York

JOINT MATERIAL FOR CAST IRON PIPE

- Hydraulic Development Co., Boston
- The Leadite Co., Philadelphia, Pa.
- United Lead Co., New York

JOISTS, STEEL

- *Truscon Steel Co., Youngstown, Ohio
- Berger Mfg. Co., Canton, Ohio
- Genfire Steel Co., Youngstown, Ohio
- Ingalls Steel Prod. Co., Birmingham, Ala.
- Kalman Steel Co., Chicago
- Wheeling Struc. Stl. Co., Wheeling, W. Va.

KETTLES, FOR ASPHALT AND TAR

- *Chausse Oil Burner Co., Elkhart, Ind.
- *Connery & Co., Inc., Philadelphia, Pa.
- *Good Roads Mch. Co., Kennett Square, Pa.
- *Jos. Honhorst Co., Cincinnati, Ohio
- *Chas. Hyatt & Co., New York
- *Littlefield Bros., Cincinnati, Ohio
- *Union Iron Works, Inc., Hoboken, N. J.
- Acme Rd. Mach. Co., Frankfort, N. Y.
- Aeroli Burner Co., West New York, N. J.
- American Steel Wks., Kansas City, Mo.
- Barber Asphalt Co., Philadelphia
- Beach Mfg. Co., Charlotte, Mich.
- Charleroi Iron Wks., Charleroi, Pa.
- Hauck Mfg. Co., Brooklyn, N. Y.
- Kinney Mfg. Co., Boston, Mass.
- Lancaster Iron Works, Inc., Lancaster, Pa.
- Macloed Co., Cincinnati, Ohio
- Spears-Wells Mch. Co., Oakland, Cal.
- G. L. Stuebner Ir. Wks., Inc., Long Island City, N. Y.
- Tarrant Mfg. Co., Saratoga Springs, N. Y.
- Universal Rd. Mach. Co., Kingston, N. Y.

LANTERNS, CONTRACTORS

- *R. E. Dietz Co., New York
- *National Carbide Sales Corp., New York
- Defiance Lantern & Stamping Co., Rochester, N. Y.
- Economy Electric Lantern Co., Chicago
- Handlan Buck Mfg. Co., St. Louis
- National Carbon Co., Inc., New York
- Star Headlight & Lantern Co., Rochester, N.Y.

LATH, METAL

- *Truscon Steel Co., Youngstown, Ohio
- Berger Mfg. Co., Canton, Ohio
- Bostwick Steel Lath Co., Niles, Ohio
- Consolidated Exp. Metals Co., Wheeling, W. Va.
- Decatur Corncor & Roofing Co., Albany, Ala.
- Edwards Mfg. Co., Cincinnati
- Genfire Steel Co., Youngstown, Ohio
- Kalman Steel Co., Chicago
- Milwaukee Corr. Co., Milwaukee, Wis.
- Northwestern Exp. Metal Co., Chicago
- St. Paul Corr. Co., St. Paul, Minn.
- Sykes Metal Lath and Roofing Co., Niles, O.
- Wheeling Corr. Co., Wheeling, W. Va.
- Youngstown Pressed Steel Co., Warren, O.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

TRY THIS NEW VALVE

COMPLETE CONTROL ANYWHERE BETWEEN COMPRESSOR & TOOL

THIS new Quick-As-Wink valve controls air under pressure as quickly—as positively and as safely as you would snap an electric light switch.

When you push valve sleeve forward, the air by-passes to hose or tool. When you push valve sleeve back, the air automatically bleeds from hose or tool, while the air from compressor is trapped, relieving all pressure beyond the valve.

By means of two "U" leather packings the air pressure itself effects the seal—the higher the pressure, the tighter the seal.

Wherever air is used under pressure, there is a place to save time and money by using Quick-As-Wink valves. They are made in the types shown to fit standard sizes of pipe and hose and are sold by leading contractor, foundry and mill supply houses everywhere.

If you would like to try Quick-As-Wink valves, write us details of your particular use and we will send the proper size and type for testing purposes.

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641 McKinley Ave. SALEM, OHIO

ALSO MAKERS OF

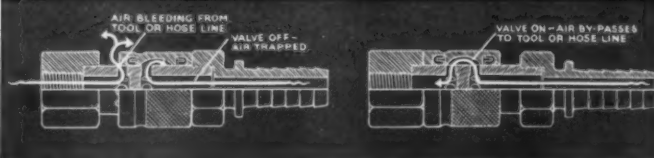
Quick-As-Wink
HOSE COUPLINGS - BUFFING WHEELS

Quick-As-Wink SHUT-OFF VALVE

500 SERIES
FEMALE THREAD
TO HOSE SHANK

600 SERIES
FEMALE THREAD
TO MALE

700 SERIES
FEMALE THREAD
TO FEMALE



WHERE TO PURCHASE

LAWN MOWERS

Coldwell Lawn Mower Co., Newburgh, N. Y.
Gibson Mfg. Co., Port Washington, Wis.
Ideal Power Lawn Mower Co., Lansing, Mich.
Jacobson Mfg. Co., Racine, Wis.
Modern Mach. Works, Milwaukee
Penna. Lawn Mower Works, Philadelphia, Pa.
Phila. Lawn Mower Co., Philadelphia, Pa.
S. F. Townsend Co., Bloomfield, N. J.
Worthington Mower Co., Stroudsburg, Pa.

LAWN MOWER SHARPENERS

Fate-Root-Heath Co., Plymouth, Ohio

LEAD-MELTING FURNACES

*Littleford Bros., Cincinnati, Ohio
Aerol Burner Co., West New York, N. J.
Chicago Flexible Shaft Co., Chicago
Hauck Mfg. Co., Brooklyn, N. Y.
Macleod Co., Cincinnati

LETTERING GUIDES

F. Weber Co., Philadelphia
Wood-Regan Inst. Co., So. Orange, N. J.

LIGHTS, ACETYLENE

*Nat'l. Carbide Sales Corp., New York
Kohler Co., Kohler, Wis.
Alex. Milburn Co., Baltimore, Md.
Oxweld Acetylene Co., New York
Westinghouse El. & Mfg. Co., E. Pittsburgh, Pa.

LIGHTING STANDARDS (See Street Lamp Posts)

LIGHTS, WARNING

*Toledo Pressed Steel Co., Toledo, Ohio
McCloskey Torch Co., Toledo, Ohio
National Carbon Co., New York
Niles Mach. Co., Lebanon, N. H.

LIQUID CHLORINE

Arnold, Hoffman & Co., Inc., New York
Electro Bleaching Gas Co., New York
Hooker Electrochemical Co., New York
Mathieson Alkali Works, Inc., New York
Penna. Salt Mfg. Co., Philadelphia, Pa.

LOADERS, GRAVEL, WAGON, CAR, ETC.

*Barber-Greene Co., Aurora, Ill.
*Bay City Shovel, Inc., Bay City, Mich.
*Burch Corp., Greentown, O.
*Chicago Automatic Conv. Co., Chicago
*Conveying Weigher Co., New York
*Heltzel St. Form & Ir. Co., Warren, Ohio
*Industrial Brownhoist Corp., Cleveland
*Nelson Iron Works, Passaic, N. J.
*New England Road Machy. Co., So. Boston.
*Trackson Co., Milwaukee, Wis.
Atlas Engineering Co., Clintonville, Wis.
Bonney Supply Co., Inc., Rochester, N. Y.
Conant Mach. Co., Concord, Mass.
Fairfield Engineering Co., Marion, Ohio
F-S Mfg. Co., New Holstein, Wis.
Gallon Iron Works & Mfg. Co., Gallon, Ohio
Gifford-Wood Co., Hudson, N. Y.
Geo. Hais Mfg. Co., N. Y.
Jeffrey Mfg. Co., Columbus, Ohio
Kent Machine Co., Kent, Ohio
Lamson Co., Syracuse, N. Y.
Lee Trailer & Body Co., Plymouth, Ind.
Link-Belt Co., Chicago
Logan Co., Louisville, Ky.
New Holland Mch. Co., N. Holland, Pa.
Northern Conveyor Co., Janesville, Wis.
Portable Machinery Co., Clinton, N. J.
H. B. Sackett Screen & Chute Co., Chicago
Spear-Wells Mch. Co., Oakland, Cal.
Specialty Engineering Co., Philadelphia, Pa.
Standard Conveyor Co., N. St. Paul, Minn.
Universal Rd. Mach. Co., Kingston, N. Y.
Weller Mfg. Co., Chicago

LOCKERS, STEEL

All-Steel Equip. Co., Aurora, Ill.
Barger Mfg. Co., Canton, Ohio
Durable Steel Locker Co., Aurora, Ill.
Durand Steel Locker Co., Chicago
Hart & Hutchinson Co., N. Britain, Conn.
Lyon Metal Products, Inc., Aurora, Ill.
Fred. Medart Mfg. Co., St. Louis, Mo.
Narragansett Mach. Co., Providence, R. I.

LOCOMOTIVES, FOR CONTRACTORS, ETC.

*Brookville Locomotive Co., Brookville, Pa.
*Davenport Loco. & Mfg. Corp., Davenport, Ia.
Baldwin Loco. Works, Philadelphia, Pa.
Fate-Root-Heath Co., Plymouth, Ohio
Heisler Locomotive Works, Erie, Pa.
Lima Loco. Works, Lima, Ohio
Mid-West Locomotive Works, Hamilton, O.
Milwaukee Loco. Mfg. Co., Milwaukee

H. K. Porter Co., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Geo. D. Whitcomb Co., Rochelle, Ill.

LUBRICANTS

*D-A Lubricant Co., Indianapolis, Ind.
*Joseph Dixon Crucible Co., Jersey City, N. J.
Atlantic Refining Co., Inc., Philadelphia
Texas Co., New York

LUBRICATORS

The Bassick Mfg. Co., Chicago
Carr Fastener Co., Cambridge, Mass.
McCord Radiator Mfg. Co., Detroit
Wayne Co., Ft. Wayne, Ind.

MAGNETOS

*Eisemann Magneto Corp., New York

MANGANESE STEEL PRODUCTS

American Manganese St. Co., Chicago, H'ts, Ill.
Taylor-Wharton Jr. & St. Co., High Bridge, N.J.

MANHOLE COVERS (See Castings)

METAL LATH (See Lath)

METAL ROOFING (See Roofing)

METER BOXES

H. W. Clark Co., Mattoon, Ill.
Clarksville Fdry. & Mach. Co., Clarksville, Tenn.
J. B. Clow & Sons, Chicago
Columbian Iron Works, Chattanooga, Tenn.
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
Ford Meter Box Co., Wabash, Ind.
Mueller Co., Decatur, Ill.
J. S. Schofield's Sons Co., Macon, Ga.

METER COUPLINGS

*Neptune Meter Co., New York
H. W. Clark Co., Mattoon, Ill.
Hersey Mfg. Co., So. Boston, Mass.
Mueller Co., Decatur, Ill.
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Union Water Meter Co., Worcester, Mass.

METER TESTERS

*Neptune Meter Co., New York
H. W. Clark Co., Mattoon, Ill.
Ford Meter Box Co., Wabash, Ind.
Mueller Co., Decatur, Ill.
National Meter Co., New York
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.

METERS, ELECTRIC (WATTHOUR)

Duncan Elec. Mfg. Co., LaFayette, Ind.
General Electric Co., Schenectady, N. Y.
Sangamo Electric Co., Springfield, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

METERS, WATER, OIL & GASOLINE

*Neptune Meter Co., New York
Badger Meter Mfg. Co., Milwaukee
Buffalo Meter Co., Buffalo, N. Y.
Gamon Meter Co., Newark, N. J.
Hersey Mfg. Co., Boston, Mass.
National Meter Co., New York
Pittsburgh Equitable Meter Co., Pittsburgh, Pa.
Phoenix Meter Co., Prince Bay, St. Isl., N. Y.
A. F. Smith Mfg. Co., E. Orange, N. J.
Thomson Meter Corp., New York
Union Water Meter Co., Worcester, Mass.
Worthington Pump & Mch. Corp., New York

METERS, WATER (VENTURI TYPE)

Builders Iron Fdry., Providence, R. I.
National Meter Co., New York
Simplex Valve & Meter Co., Philadelphia, Pa.

MIXERS, CONCRETE (See Concrete Mixers)

MIXERS, GROUT

*Jaeger Mach. Co., Columbus, O.
*Lakewood Eng. Co., Cleveland, Ohio
*Littleford Bros., Cincinnati
*Union Iron Works, Inc., Hoboken, N. J.
*T. L. Smith Co., Milwaukee, Wis.
Kent Mach. Co., Cuyahoga Falls, Ohio

MIXERS, MORTAR

*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Jaeger Machine Co., Columbus, Ohio
*Kochring Co., Milwaukee
*Lakewood Eng. Co., Cleveland, Ohio

*Kwik-Mix Concrete-Mixer Co., Port Washington, Wis.
*Lansing Co., Lansing, Mich.
*John Lauson Mfg. Co., New Holstein, Wis.
*Ransome Conc. Mch. Co., Dunellen, N. J.
*T. L. Smith Co., Milwaukee, Wis.
Anchor Mfg. Co., Chicago
Archer Iron Works, Chicago
Blystone Mfg. Co., Cambridge Spgs., Pa.
Construction Machy. Co., Waterloo, Iowa
Norris K. Davis, San Francisco, Calif.
Kent Machine Co., Kent, Ohio
Kiel Machine Co., Kiel, Wis.
Knickerbocker Co., Jackson, Mich.
Meili-Blumberg Co., New Holstein, Wis.
Standard Scale & Sup. Corp., Pittsburgh
Talbot-Flood Mfg. Co., Kansas City, Mo.

MIXERS, PLASTER

*Conveying Weigher Co., N. Y.
*Jaeger Machine Co., Columbus, Ohio
*John Lauson Mfg. Co., New Holstein, Wis.
Anchor Mfg. Co., Chicago
Blystone Mfg. Co., Cambridge Spgs., Pa.
Construction Machy. Co., Waterloo, Iowa
Norris K. Davis, San Francisco, Calif.
Easick & Co., Los Angeles, Cal.
Knickerbocker Co., Jackson, Mich.
Leach Co., Oshkosh, Wis.
Meili-Blumberg Co., New Holstein, Wis.
Rommel Mfg. Co., Kewaskum, Wis.
Standard Scale & Sup. Corp., Pittsburgh
Talbot-Flood Mfg. Co., Kansas City, Mo.

MORTAR BOXES

*General Wheelbarrow Co., Cleveland, Ohio
*Heltzel St. Form & Ir. Co., Warren, Ohio
*Jos. Honhorst Co., Cincinnati, Ohio
*Littleford Bros., Cincinnati
Anchor Mfg. Co., Chicago, Ill.
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
Canton Art Metal Co., Canton, Ohio
Cleveland Wheelbarrow Co., Cleveland
Darlach Can & Iron Wks., Brooklyn, N. Y.
Norris K. Davis, San Francisco, Calif.
Donley Bros. Co., Cleveland, O.
Empire Metal Tank Wks., E. Rochester, N. Y.

MOTORCYCLES

Excelsior Motor Mfg. & Supply Co., Chicago
Harley-Davidson Motor Co., Milwaukee
Indian Motorcycle Co., Springfield, Mass.

MOTORS, GASOLINE (See Engines, Gas and Gasoline)

MOTOR TRUCKS

*Dodge Bros. Corp., Detroit
*Freeman Motor Co., Detroit
*International Harvester Co., Chicago
Acme Motor Truck Co., Cadillac, Mich.
Amer.-La France & Foamite Corp., New York
Atterbury Motor Car Co., Buffalo, N. Y.
Autocar Co., Ardmore, Pa.
Brockway Motor Truck Co., Cortland, N. Y.
Clydesdale Motor Truck Co., Clyde, Ohio
Diamond T. Motor Car Co., Chicago
Duplex Truck Co., Lansing, Mich.
Federal Motor Truck Co., Detroit
Ford Motor Co., Detroit
Four Wheel Drive Auto Co., Clintonville, Wis.
General Motors Truck Co., Chicago
Gramm Motors, Inc., Lima, Ohio
The Hug Co., Highland, Ill.
Indiana Truck Corp., Marion, Ind.
La France-Republic Sales Corp., New York
Larabee-Deyo Motor Tr. Co., Binghamton, N.Y.
Luedinghaus-Espenschied Wagon Co., St. Louis
Mack Trucks, Inc., New York
Pierce-Arrow Motor Car Co., Buffalo
Prospect Fire Engine Co., Prospect, O.
Reo Motor Car Co., Lansing, Mich.
Standard Motor Truck Co., Detroit
Sterling Motor Truck Co., Milwaukee
Stewart Motor Corp., Buffalo, N. Y.
Traffic Motor Tr. Co., St. Louis, Mo.
Walter Motor Truck Co., L. I. City, N. Y.
White Co., Cleveland, Ohio
Yellow Truck & Coach Mfg. Co., Chicago

MOULDS, CONCRETE

*Blaw-Knox Co., Pittsburgh, Pa.
*Heltzel St. Form & Ir. Co., Warren, Ohio

MUCKING, MACHINES

Hoar Shovel Co., Duluth, Minn.

NUMBERS, HOUSE (See House Numbers)

OILS, ROAD

*Standard Oil Co. (Indiana), Chicago
*Standard Oil Co. (N. Y.), N. Y.
Atl. Ref. Co., Inc., Philadelphia, Pa.
Barber Asphalt Co., Philadelphia, Pa.
Headley Emulsified Prod. Co., Phila.
Standard Oil Co. (La.), N. Orleans, La.
Standard Oil Co. (N. J.), Newark, N. J.
Texas Company, N. Y.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover. *

Digging Power—

ability to go right into solid ground, rip it out and put the spoil up into the truck without destructive strains on the machinery,—is characteristic of



The NELSON Q-7 LOADER

on McCormick Tractor

The continuous spiral feeders make digging a continuous operation with the shocks smoothed out into a steady continuous flow of power from the engine to feeder, resulting in—

**LESS WEAR and TEAR,
LESS TIME OUT,
LONGER LIFE**

Ask us about it

The N. P. NELSON IRON WORKS, Inc.
822 Bloomfield Avenue :: Passaic, N. J.

WHERE TO PURCHASE

OXY-ACETYLENE APPARATUS

Macleod Co., Cincinnati
 Alex. Milburn Co., Baltimore, Md.
 Oxweld Acetylene Co., Long Island City, N. Y.

PACKING, WATER PIPE

The Leadite Co., Philadelphia, Pa.
 National Lead Company, N. Y.

PAINTING MACHINERY

*Littleford Bros., Cincinnati
 Binks Spray Equipment Co., Chicago
 Chicago Pneumatic Tool Co., New York
 De Vilbiss Mfg. Co., Toledo, Ohio
 Eclipse Air Brush Co., Newark, N. J.
 Hobart Brothers Co., Troy, Ohio
 Macleod Co., Cincinnati
 W. N. Matthews Corp., St. Louis
 Alex. Milburn Co., Baltimore, Md.
 Pasche Air Brush Co., Chicago
 Simons Paint Spray Brush Co., Dayton, Ohio
 Spraco Painting Equip. Co., Boston

PAINTS, METAL PROTECTION

*Barrett Co., New York
 *Carey Co., Philip, Cincinnati
 *Jos. Dixon Crucible Co., Jersey City, N. J.
 *McEverlast, Inc., Los Angeles, Calif.
 *Servicised Premoulded Products, Chicago
 *Solway Sales Corp., New York
 Acme White Lead & Color Works, Detroit
 Barber Asphalt Co., Philadelphia, Pa.
 Berry Bros., Detroit
 Cook Paint & Varnish Co., Kansas City, Mo.
 Detroit Graphite Co., Detroit
 Detroit White Lead Works, Detroit
 E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
 Euclid Chemical Co., Cleveland, Ohio
 Headley Emulsified Prod. Co., Phila.
 Hoosier Paint Works, Ft. Wayne, Ind.
 Minwax Co., N. Y.
 Ruberoid Co., N. Y.
 Sherwin-Williams Co., Cleveland, Ohio
 L. Sonneborn Sons, N. Y.
 Toch Brothers, N. Y.
 Tropical Paint & Oil Co., Cleveland, Ohio
 Truscon Laboratories, Detroit

PARK BENCHES

Logan Co., Louisville, Ky.
 Fred J. Meyers Mfg. Co., Hamilton, Ohio
 Millersville Supply Co., Millersville, Pa.
 Stewart Iron Works Co., Cincinnati, Ohio
 Van Dorn Iron Works Co., Cleveland

PAVEMENT BREAKERS (See Breakers)

PAVERS, CONCRETE

*Chain Belt Co., Milwaukee, Wis.
 *Foote Co., Munda, N. Y.
 *Jaeger Mach. Co., Columbus, Ohio
 *Kochring Co., Milwaukee
 *Bansome Conc. Machy. Co., Dunellen, N. J.
 *T. L. Smith Co., Milwaukee
 American Cem. Machy. Co., Keokuk, Ia.

PAVING AND ROAD ROLLERS (See Road and Paving Rollers)

PAVING BLOCKS, CREOSOTED WOOD (See Creosoted Blocks)

PAVING BRICK

Alton Brick Co., Alton, Ill.
 Buckeye Shale Brick Co., Cleveland, Ohio
 Buffalo Brick Co., Buffalo, Kans.
 Cleveland Brick & Clay Co., Cleveland, Ohio
 Collinwood Shale Brick Co., Cleveland, Ohio
 Corry Brick & Tile Corp., Corry, Pa.
 Crescent Brick Co., Pittsburgh, Pa.
 Euclid Shale Brick Co., Cleveland, Ohio
 Georgia Vit. Brick Co., Augusta, Ga.
 Globe Brick Co., E. Liverpool, Ohio
 Hammond Fire Brick Co., Fairmount, W. Va.
 Hixlvavia Coal Co., Columbus, Ohio
 Hocking Valley Brick Co., Columbus, Ohio
 McAvoy Brick Co., Bridgeville, Pa.
 Mayer Brick Co., Bridgeville, Pa.
 Metropolitan Paving Brick Co., Pittsburgh, Kans.
 Metropolitan Paving Brick Co., Canton, Ohio
 Mineral-Wells Brick Co., Mineral Wells, Tex.
 Moberly Paving Brick Co., Moberly, Mo.
 Murphysboro Paving Brick Co., Murphysboro, Ill.
 Nelson Brick Co., Nelsonville, Ohio
 Nelsonville Brick Co., Columbus, Ohio
 Patton Clay Mfg. Co., Patton, Pa.
 Paxton Brick Co., Watsonstown, Pa.
 Peebles Paving Brick Co., Portsmouth, Ohio
 Peoria Brick & Tile Co., Peoria, Ill.
 Parington Paving Brick Co., Galesburg, Ill.

Ross Shale Brick Co., Veedersburg, Ill.
 Russell Clay Mfg. Co., Alton, Ala.
 So. Clay Mfg., Chattanooga, Tenn.
 Springfield Paving Brick, Springfield, Ill.
 Sterling Brick Co., Olean, N. Y.
 Streater Clay Mfg. Co., Streater, Ill.
 Terra Haute Vit. Brick Co., Terre Haute, Ind.
 Thornton Fire Brick Co., Clarksburg, W. Va.
 Thurber Brick Co., Thurber, Tex.
 Toronto Fire Clay Co., Toronto, Ohio
 Trinidad Brick & Tile Co., Trinidad, Ohio
 United Clay Products Corp., Kansas City
 Western Shale Products Co., Ft. Scott, Kans.
 Westport Paving Brick Co., Westport, Md.

PAVING GUARDS, STEEL

W. S. Godwin Co., Baltimore, Md.

PAVING MACHINERY (See Road and Paving Machinery)

PAVING MATERIALS (See "Asphalt," "Paving Brick," "Granite Block," etc.)

PAVING MIXERS (See Concrete Mixers)

PAVING TOOLS

*Chausse Oil Burner Co., Elkhart, Ind.
 *Connery & Co., Philadelphia, Pa.
 *F. D. Gummer & Sons Co., Cleveland, Ohio
 *Jos. Honhorst Co., Cincinnati, Ohio
 *Littleford Bros. Co., Cincinnati, Ohio
 Acroll Burner Co., West New York, N. J.
 American Steel Wks., Kansas City, Mo.
 Barber Asphalt Co., Philadelphia
 Hauck Mfg. Co., Brooklyn, N. Y.
 Warren Bros. Co., Boston

PICKS

Hubbard Co., Pittsburgh
 Iron City Tool Works, Pittsburgh
 Oliver Iron & Steel Corp., Pittsburgh
 Verona Tool Works, Verona, Pa.
 Warren Tool & Forge Co., Warren, Ohio
 Warwood Tool Co., Wheeling, W. Va.
 Wyoming Shovel Works, Wyoming, Pa.

PILE DRIVERS

*McKiernan-Terry Corp., N. Y.
 *Union Iron Works, Inc., Hoboken, N. J.
 Harnischfeger Corp., Milwaukee
 Mead-Morrison Mfg. Co., East Boston
 Vulcan Iron Wks., Chicago

PILE-HAMMERS, STEAM

*McKiernan-Terry Corp., N. Y.
 *Union Iron Works, Inc., Hoboken, N. J.
 Vulcan Iron Works, Chicago

PILING, CONCRETE

MacArthur Conc. Pile & F'd'n. Co., N. Y.
 Raymond Concrete Pile Co., N. Y.

PILING, INTERLOCKING STEEL

*S. W. Lindheimer, Chicago
 *Wemlinger, Inc., New York
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie Steel Co., Pittsburgh

PILING, STEEL SHEET

*S. W. Lindheimer, Chicago
 *Wemlinger, Inc., New York
 Bethlehem Steel Co., Bethlehem, Pa.

PIPE, CAST IRON

*Central Foundry Co., N. Y.
 *U. S. Pipe & Foundry Co., Burlington, N. J.
 Am. Cast Iron Pipe Co., Birmingham, Ala.
 J. B. Clow & Sons, Chicago
 Donaldson Iron Co., Emsau, Pa.
 John Fox & Co., New York
 Glamorgan Pipe & F'dry. Co., Lynchburg, Va.
 Lynchburg F'dry. Co., Lynchburg, Va.
 McWane Cast Iron Pipe Co., Birmingham, Ala.
 National Cast Iron Pipe Co., Birmingham, Ala.
 Ric-wil Co., Cleveland
 Warren Foundry & Pipe Co., N. Y.
 R. D. Wood & Co., Philadelphia, Pa.

PIPE, CULVERT (See Culverts)

PIPE, LEAD

National Lead Company, N. Y.

PIPE, REINFORCED CONCRETE

*Newark Concrete Pipe Co., Newark, N. J.
 Concrete Products Co., Pittsburgh, Pa.
 Independent Concrete Pipe Co., Indianapolis
 Lock Joint Pipe Co., Ampere, N. J.

PIPE, RIVETED STEEL OR IRON

*Connery & Co., Inc., Philadelphia, Pa.
 *Jos. Honhorst Co., Cincinnati, O.
 *Littleford Bros., Cincinnati, O.

Abendroth & Root Mfg. Co., Newburgh, N. Y.
 Biggs Boiler Works, Akron
 Chattanooga Boiler & Tank Co., Chatta., Tenn.
 Chicago Bridge & Iron Works, Chicago
 East Jersey Pipe Co., N. Y.
 Hammond Iron Works, Warren, Pa.
 R. Hardesty Mfg. Co., Denver
 Lancaster Iron Works, Lancaster, Pa.
 Petroleum Iron Wks. Co., Sharon, Pa.
 Pittsburgh-Des Moines Steel Co., Pittsb'g, Pa.
 Taylor Forge & Pipe Wks., Chicago
 Tippet & Wood, Phillipsburg, N. J.
 Weller Mfg. Co., Chicago

PIPE, STEEL

Central Tube Co., Pittsburgh, Pa.
 Jones & Laughlin Steel Co., Pittsburgh
 National Tube Co., Pittsburgh
 Republic Iron & Steel Co., Youngstown, O.
 South Chester Tube Co., Chester, Pa.
 Spang-Chalfont & Co., Pittsburgh, Pa.
 Wheeling Steel Corp., Wheeling, W. Va.
 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, WOOD

American Wood Pipe Co., Tacoma, Wash.
 Federal Tank & Pipe Co., Seattle, Wash.
 Michigan Pipe Co., Bay City, Mich.
 National Tank & Pipe Co., Portland, Ore.
 Pacific Pipe & Tank Co., San Francisco
 Redwood Mfrs. Co., San Francisco
 Standard Wood Pipe Co., Williamsport, Pa.
 A. Wyckoff & Sons Co., Elmira, N. Y.

PIPE, WROUGHT IRON

A. M. Byers Co., Pittsburgh, Pa.
 Cohoes Rolling Mill Co., Cohoes, N. Y.
 Reading Iron Co., Reading, Pa.
 South Chester Tube Co., Chester, Pa.

PIPE BENDING MACHINES

American Pipe Bending Mach. Co., Boston
 Watson-Stillman Co., New York

PIPE COVERING

AIRCCELL

*Philip Carey Co., Cincinnati, Ohio
 Ehret Mag. Mfg. Co., Valley Forge, Pa.
 Johns-Manville, Inc., N. Y.
 Keasbey & Mattison Co., Ambler, Pa.
 National Asbestos Co., Jersey City, N. J.
 Norristown Mag. & Asb. Co., Norristown, Pa.
 Sall Mountain Co., Chicago

85 PER CENT MAGNESIA

*Philip Carey Co., Cincinnati, Ohio
 Ehret Mag. Mfg. Co., Valley Forge, Pa.
 Johns-Manville, Inc., N. Y.
 Keasbey & Mattison Co., Ambler, Pa.
 Norristown Mag. & Asb. Co., Norristown, Pa.

WOOD

Redwood Mfrs. Co., San Francisco
 A. Wyckoff & Sons Co., Elmira, N. Y.

PIPE CUTTERS (See Cutters, Pipe, Head)

PIPE FITTINGS

*Central Foundry Co., N. Y.
 *U. S. Pipe & Foundry Co., Burlington, N. J.
 American Cast Iron Co., Birmingham, Ala.
 Builders Iron Foundry, Providence, R. I.
 J. B. Clow & Sons, Chicago
 Crane Co., Chicago
 Donaldson Iron Co., Emsau, Pa.
 Kennedy Valve Mfg. Co., Elmira, N. Y.
 Lunkenheimer Co., Cincinnati, O.
 Natl. C. I. Pipe Co., Birmingham, Ala.
 Reading Steel Casting Co., Inc., Bridgeport, Conn.
 Walworth Co., Boston
 Warren Foundry & Pipe Co., N. Y.
 R. D. Wood & Co., Philadelphia, Pa.

PIPE HANDLING MACHINERY

*W-K-M Co., Houston, Tex.
 Taylor Portable Steel Derrick Co., Chicago

PIPE PUSHERS

*Templeton, Kenly & Co., Chicago
 H. W. Clark Co., Mattok, Ill.
 Duff-Norton Mfg. Co., Pittsburgh
 Easy Mfg. Co., Lincoln, Neb.
 Giant Mfg. Co., Council Bluffs, Ia.

PIPE TAPPING MACHINERY (See Water Main Tapping)

PIPE THREADERS

Armstrong Mfg. Co., Bridgeport, Conn.

PLANERS, PNEUMATIC

*Touley Tool Co., Cleveland, Ohio

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.*

Down 15 years—but it
was easy for their

McKIERNAN- TERRY Hammer to pull them!



Pulling 30-ft. timber piles on the Arlington Memorial Bridge project, Washington, D. C.

McKiernan-Terry Corporation manufactures the largest line of double-acting pile hammers in the world. Write for our catalog for complete descriptions of various types and their many interesting applications.



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**McKIERNAN-TERRY DOUBLE ACTING
PILE HAMMERS**

WHEN the contractor on The Arlington Memorial Bridge at Washington, D. C., tackled his foundation work, he ran into a group of 50 timber piles driven fifteen years ago, at the exact point where one of the new bridge piers was to be erected.

Equipped with a McKiernan-Terry size number 7 pile hammer the removal of these piles was an easy job even though they had been down 15 years and averaged 30 ft. in length.

The contractor equipped with a McKiernan-Terry Pile Hammer is *well-equipped* to handle *any* pile pulling or driving job, quickly and economically.

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*Serviced Premoulded Products, Chicago

PLAYGROUND APPARATUS

American Playground Device Co., Anderson, Ind.
Chicago Gymnasium Equipment Co., Chicago
Everwear Mfg. Co., Springfield, O.
Giant Mfg. Co., Council Bluffs, Ia.
Hill-Standard Co., Anderson, Ind.
R. F. Lamar & Co., Pueblo, Colo.
Fred. Medart Mfg. Co., St. Louis, Mo.
Mitchell Mfg. Co., Milwaukee
Patterson-Williams Co., San Jose, Calif.
A. G. Spalding & Bros., Chicopee, Mass.

FLAWS, CONTRACTORS'

*Austin-Western Road Mach. Co., Chicago
*Caterpillar Trac. Co., San Leandro, Calif.
*General Wheelbarrow Co., Cleveland
*International Harvester Co., Chicago
*Wiard Plow Co., Batavia, N. Y.
J. D. Adams Co., Indianapolis, Ind.
American Steel Scraper Co., Sidney, O.
Deere & Co., Moline, Ill.
Galion Iron Works & Mfg. Co., Galion, O.
Minneapolis-Moline Power Implement Co., Minneapolis
Oliver Farm Equip. Co., South Bend, Ind.
Ryan Mfg. Corp., Chicago
Sidney Steel Scraper Co., Sidney, O.
Slusser-McLean Scraper Co., Sidney, O.
Western Wheeled Scraper Co., Aurora, Ill.

FLAWS, ROAD AND ROOPER

*Austin-Western Road Machinery Co., Chicago
*Caterpillar Tractor Co., San Leandro, Calif.
*General Wheelbarrow Co., Cleveland
*Wiard Plow Co., Batavia, N. Y.
Acme Road Machy. Co., Frankfort, N. Y.
J. D. Adams Co., Indianapolis
American Steel Scraper Co., Sidney, Ohio
Beach Mfg. Co., Charlotte, Mich.
Ted Carr & Co., Chicago
Deere & Co., Moline, Ill.
Galion Iron Works & Mfg. Co., Galion, Ohio
P. B. Hackley Equip. Co., San Francisco
Ryan Mfg. Corp., Chicago
Sidney Steel Scraper Co., Sidney, Ohio
Slusser-McLean Scraper Co., Sidney, Ohio
Western Wheeled Scraper Co., Aurora, Ill.

PLUMBING SUPPLIES

J. B. Clow & Sons, Chicago
Crane Co., Chicago
Glauber Brass Mfg. Co., Cleveland, O.
J. L. Mott Iron Works, N. Y.
Mueller Company, Decatur, Ill.
Randle-Spence Mfg. Co., Milwaukee
United-Obendorf Corp., Cleveland
Walworth Mfg. Co., Boston

PORTABLE BUILDINGS

*Blaw-Knox Co., Pittsburgh, Pa.
*Littleford Bros., Cincinnati, O.
*Truscon Steel Co., Youngstown, O.

PORTABLE STEEL DERRICKS (See Derricks, Steel Portable)

PORTABLE WOOD WORKERS

*American Saw Mill Machinery Co., Hacketts-town, N. J.
*Jones Superior Machine Co., Chicago
Jaeger Portable Power Corp., Detroit

PORTLAND CEMENT (See Cement)

POTS, ASPHALT AND TAR, POURING

*Littleford Bros., Cincinnati, Ohio
Acme Road Machinery Co., Frankfort, N. Y.
Barber Asphalt Co., Philadelphia
Beach Manufacturing Co., Charlotte, Mich.
Tarrant Mfg. Co., Saratoga Springs, N. Y.

POWER PLANTS, INDUSTRIAL

*Continental Motors Corp., Muskegon, Mich.
*Hercules Motors Corp., Canton, O.
*John Lauson Mfg. Co., New Holstein, Wis.
*Le Roi Co., Milwaukee
*Waukesha Motor Co., Waukesha, Wis.
*Wisconsin Motor Co., Milwaukee, Wis.
Buda Co., Harvey, Ill.
Climax Engine Co., Clinton, Iowa
Fuller & Johnson Mfg. Co., Madison, Wis.
Hinkley Motors, Inc., Detroit
Serval Mfg. Co., Evansville, Ind.
Universal Motor Co., Oshkosh, Wis.

PULLING MACHINES

*Beebe Bros., Inc., Seattle, Wash.
*Clyde Iron Works Sales Co., Duluth, Minn.
*T. H. Edelblute Co., Pittsburgh
John Waldron Corp., New Brunswick, N. J.

PUMPS, AIR LIFT

*Sullivan Machinery Co., Chicago
American Steam Pump Co., Battle Creek, Mich.
Chicago Pneumatic Tool Co., New York
Gardner-Denver Co., Quincy, Ill.
Indiana Pump & Compr. Co., Indianapolis
Ingersoll-Rand Co., New York

PUMPS, CENTRIFUGAL

*Allis-Chalmers Mfg. Co., Milwaukee
*Barnes Mfg. Co., Mansfield, O.
*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Chain Belt Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Erie Pump & Engine Works, Medina, N. Y.
*Homelite Corp., Port Chester, N. Y.
*Jaeger Mach. Co., Columbus, O.
*John Lauson Mfg. Co., New Holstein, Wis.
*La Bour Co., Inc., Elkhart, Ind.
*Novo Engine Co., Lansing, Mich.
Aldrich Pump Co., Allentown, Pa.
American Steam Pump Co., Battle Creek, Mich.
American Well Works, Aurora, Ill.
Aurora Pump & Mfg. Co., Aurora, Ill.
Buffalo Steam Pump Co., Buffalo, N. Y.
A. S. Cameron Steam Pump Works, New York
Chicago Pump Co., Chicago
Cook Motor Co., Delaware, O.
Dayton-Dowd Co., Quincy, Ill.
Dean Hill Pump Co., Anderson, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Evinrude Div., Outboard Motors Corp., Milwaukee

Fairbanks, Morse & Co., Chicago
General Electric Co., Schenectady
Goulds Pumps, Inc., Seneca Falls, N. Y.
Humphreys Mfg. Co., Mansfield, Ohio
Indiana Pump & Compr. Co., Indianapolis
Ingersoll-Rand Co., New York
Keystone Driller Co., Beaver Falls, Pa.
LeCourtenay Co., Newark, N. J.
Manistee Iron Works, Manistee, Mich.
Morris Machine Works, Baldwinville, N. Y.
Pelton Water Wheel Co., San Francisco, Cal.
Ramsey Pump Co., Seneca Falls, N. Y.
Sterling Machy. Corp., Kansas City, Mo.
Trench & Marine Pump Co., New York
United Iron Works, Inc., Kansas City, Mo.
Warren Steam Pump Co., Warren, Mass.
Weinman Pump Mfg. Co., Columbus, O.
Worthington Pump & Machinery Corp., N. Y.

PUMPS, CONTRACTORS'

*Allis-Chalmers Mfg. Co., Milwaukee
*Barnes Mfg. Co., Mansfield, O.
*Ralph B. Carter Co., New York
*C. H. & E. Mfg. Co., Milwaukee
*Chain Belt Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Erie Pump & Engine Works, Medina, N. Y.
*Homelite Corp., Port Chester, N. Y.
*La Bour Co., Inc., Elkhart, Ind.
*Jaeger Machine Co., Columbus, O.
*John Lauson Mfg. Co., New Holstein, Wis.
*Novo Engine Co., Lansing, Mich.
*Tool & Device Corp., Waterford, N. Y.
*Union Iron Works, Hoboken, N. J.
*Waukesha Motor Co., Waukesha, Wis.
Aldrich Pump Co., Allentown, Pa.
American Steam Pump Co., Battle Creek, Mich.
American Well Works, Aurora, Ill.
Aurora Pump & Mfg. Co., Aurora, Ill.
Buda Co., Harvey, Ill.
A. S. Cameron Steam Pump Works, New York
Construction Machinery Co., Waterloo, Iowa
Dayton-Dowd Co., Quincy, Ill.
Deming Co., Salem, O.
Emerson Pump & Valve Co., Alexandria, Va.
Evinrude Div., Outboard Motors Corp., Milwaukee

Fairbanks, Morse & Co., Chicago
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, New York
Humphreys Mfg. Co., Mansfield, Ohio
Ingersoll-Rand Co., New York
Jaeger Portable Power Corp., Detroit
Kinney Mfg. Co., Boston
LeCourtenay Co., Newark, N. J.
Morris Machine Works, Baldwinville, N. Y.
F. E. Myers & Bros. Co., Ashland, O.
Pulsometer Steam Pump Co., New York
Ramsey Pump Co., Seneca Falls, N. Y.
Standard Scale & Supply Corp., Pittsburgh
Trench & Marine Pump Co., New York
Van Nounhuys Machine Works, Albany, N. Y.
Waldo Bros. & Bond Co., Boston, Mass.
Weinman Pump Mfg. Co., Columbus, O.

PUMPS, DEEP WELL

*Barnes Mfg. Co., Mansfield, O.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Novo Engine Co., Lansing, Mich.
Alamo Eng. Co., Hilldale, Mich.
Aldrich Pump Co., Allentown, Pa.
American Steam Pump Co., Battle Creek, Mich.
American Well Works, Aurora, Ill.
A. S. Cameron Steam Pump Works, New York
A. D. Cook, Inc., Lawrenceburg, Ind.
Dean Hill Pump Co., Anderson, Ind.
Deming Co., Salem, O.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Humphreys Mfg. Co., Mansfield, Ohio
Indiana Pump & Compr. Co., Indianapolis
Ingersoll-Rand Co., New York
Keystone Driller Co., Beaver Falls, Pa.
Layne & Bowler, Inc., Memphis, Tenn.

A. Y. McDonald Mfg. Co., Dubuque, Iowa
F. E. Myers & Bros. Co., Ashland, O.
Pelton Water Wheel Co., San Francisco, Cal.
Pomona Pump Co., Pomona, Cal.
Ramsey Pump Co., Seneca Falls, N. Y.
Trench & Marine Pump Co., New York
United Iron Works, Inc., Kansas City, Mo.
Weinman Pump Mfg. Co., Columbus, O.
Worthington Pump & Machy. Corp., New York

PUMPS, DIAPHRAGM

*Barnes Mfg. Co., Mansfield, O.
*C. H. & E. Mfg. Co., Milwaukee
*Ralph B. Carter Co., New York
*Chain Belt Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Novo Engine Co., Lansing, Mich.
Construction Machinery Co., Waterloo, Ia.
Deming Co., Salem, Ohio
Dorr Co., New York
Goulds Pumps, Inc., Seneca Falls, N. Y.
Humphreys Mfg. Co., Mansfield, Ohio
Sterling Machy. Corp., Kansas City, Mo.
Trench & Marine Pump Co., New York
Waldo Bros. & Bond Co., Boston, Mass.
Witte Engine Works, Kansas City, Mo.

PUMPS, DREDGING

*Erie Pipe & Engine Wks., Medina, N. Y.
*Novo Engine Co., Lansing, Mich.
Ellicott Machinery Corp., Baltimore, Md.
Morris Machine Works, Baldwinville, N. Y.
Trench & Marine Pump Co., New York

PUMPS, GASOLINE AND OIL

*Novo Engine Co., Lansing, Mich.
S. F. Bowser & Co., Inc., Ft. Wayne, Ind.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Ingersoll-Rand Co., New York
Kinney Mfg. Co., Boston
Sterling Machy. Corp., Kansas City, Mo.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
Wayne Co., Ft. Wayne, Ind.

PUMPS, PORTABLE

*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Homelite Corp., Port Chester, N. Y.
*Jaeger Machine Co., Columbus, O.
*John Lauson Mfg. Co., New Holstein, Wis.
*LaBour Co., Elkhart, Ind.
*Novo Engine Co., Lansing, Mich.
*Union Iron Works, Hoboken, N. J.
American Steam Pump Co., Battle Creek, Mich.
Evinrude Div., Outboard Motors Corp., Milwaukee
Humphreys Mfg. Co., Mansfield, Ohio
Jaeger Portable Power Corp., Detroit
Trench & Marine Pump Co., New York

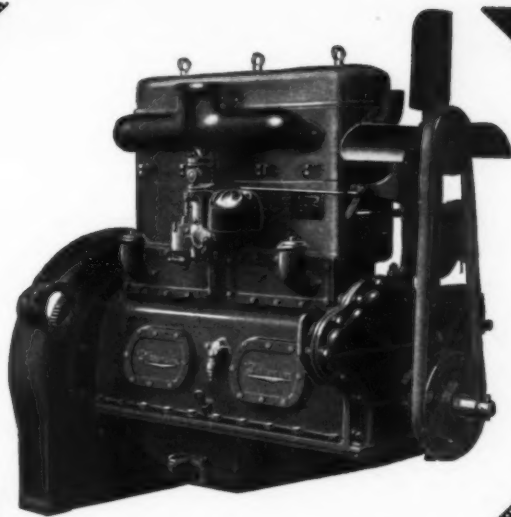
PUMPS, POWER

*Allis-Chalmers Mfg. Co., Milwaukee
*Barnes Mfg. Co., Mansfield, O.
*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Homelite Corp., Port Chester, N. Y.
*Jaeger Mach. Co., Columbus, O.
*LaBour Co., Elkhart, Ind.
*Novo Engine Co., Lansing, Mich.
*Waukesha Motor Co., Waukesha, Wis.
Alamo Iron Works, San Antonio, Texas
Aldrich Pump Co., Allentown, Pa.
American Steam Pump Co., Battle Creek, Mich.
American Well Works, Aurora, Ill.
Aurora Pump & Mfg. Co., Aurora, Ill.
Chicago Pump Co., Chicago
Dayton, Dowd Co., Quincy, Ill.
Dean Bros. Co., Indianapolis
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Evinrude Div., Outboard Motors Corp., Milwaukee
Fairbanks, Morse & Co., Chicago
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Humphreys Mfg. Co., Mansfield, Ohio
Indiana Pump & Compr. Co., Indianapolis
Ingersoll-Rand Co., New York
Kinney Mfg. Co., Boston
Lawrence Machinery Co., Lawrence, Mass.
LeCourtenay Co., Newark, N. J.
F. E. Myers & Bros. Co., Ashland, O.
Northern Pump Co., Minneapolis
Ramsey Pump Co., Seneca Falls, N. Y.
Trench & Marine Pump Co., New York
Waterous Fire Eng. Wks., St. Paul, Minn.
Weinman Pump Mfg. Co., Columbus, O.
Worthington Pump & Machinery Corp., N. Y.
Yeomans Bros. Co., Chicago

PUMPS, SEWAGE

*Barnes Mfg. Co., Mansfield, O.
*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Jaeger Mach. Co., Columbus, O.
*Novo Engine Co., Lansing, Mich.
American Steam Pump Co., Battle Creek, Mich.
American Well Works, Aurora, Ill.
A. S. Cameron Steam Pump Works, New York
Chicago Pump Co., Chicago
Fairbanks, Morse & Co., Chicago
Humphreys Mfg. Co., Mansfield, Ohio
Ingersoll-Rand Co., New York
Pacific Flush Tank Co., Chicago and N. Y.
Warren Steam Pump Co., Warren, Mass.
Yeomans Bros. Co., Chicago

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"More Power per Cubic Inch"
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Wisconsin Engines are first acclimat-
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You can run Wisconsin Engines continuously, under full
load, on the hottest days, without overheating or loss of
efficiency. And Admiral Byrd selected Wisconsin-
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Made in a full range of
Sixes and Fours, from
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dustrial machinery,
trucks and tractors.

Wisconsin Motor Co.

Milwaukee
Wisconsin

WISCONSIN
MORE  POWER
ENGINES

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PUMPS, TAR AND ASPHALT

*Littleford Bros., Cincinnati
Barber Asphalt Co., Philadelphia, Pa.
Kinney Mfg. Co., Boston

PUNCHES AND DIES, STEEL

Cleveland Steel Tool Co., Cleveland, O.

RADIATORS FOR GASOLINE ENGINES

McCord Radiator Mfg. Co., Detroit
Modine Mfg. Co., Racine, Wis.
Perfex Corp., Milwaukee
Young Radiator Co., Racine, Wis.

RAIL AND RAIL JOINTS

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Koppel Ind. Car & Equipment Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.
W. A. Zelnicker Supply Co., St. Louis, Mo.

RAILROAD DITCHERS (See Excavators, Ditch and Trench)

REINFORCING CONCRETE (See Concrete Reinforcement)

RINGS AND BANDS FOR CONCRETE MIXERS AND ROAD MACHINERY

*American Welding & Mfg. Co., Warren, O.

RIVETERS, PNEUMATIC

*The Buhl Company, Chicago
*Independent Pneu. Tool Co., Chicago
Chicago Pneumatic Tool Co., New York
Cleveland Pneumatic Tool Co., Cleveland, O.
Hanna Engineering Works, Chicago
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Co., New York
Wm. H. Keller, Inc., Grand Haven, Mich.
Southwark Foundry & Machine Co., Phila.

RIVET SETS

*Independent Pneu. Tool Co., Chicago
Chicago Pneumatic Tool Co., New York
Cleveland Pneumatic Tool Co., Cleveland, O.
Cleveland Steel Tool Co., Cleveland, O.
Ingersoll-Rand Co., New York

ROAD GRADERS, HORSE OR TRACTOR DRAWN

*Austin-Western Road Machy. Co., Chicago
*Caterpillar Tractor Co., San Leandro, Cal.
*W. A. Riddell Co., Bucyrus, O.
*Rome Mfg. Co., Rome, N. Y.
*Gustav Schaefer Co., Cleveland
*Moritz & Bennett Corp., Birmingham, Ill.
*New England Road Machy. Co., So. Boston.
Acme Road Machy. Co., Frankfort, N. Y.
J. D. Adams Co., Indianapolis, Ind.
Austin Mfg. Co., Chicago
Banting Mfg. Co., Toledo, O.
Beach Mfg. Co., Charlotte, Mich.
Gallion Iron Works & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
Killefer Mfg. Co., Los Angeles
Klauser Mfg. Co., Dubuque, Iowa
N. S. Monroe & Sons, Arthur, Ill.
Owensboro Ditcher & Grader Co., Owensboro, Ky.
Ryan Mfg. Corp., Chicago
Spears-Wells Machinery Co., Oakland, Cal.
Stockland Road Machinery Co., Minneapolis
Western Wheeled Scraper Co., Aurora, Ill.

ROAD GRADERS, POWER

*Austin-Western Road Mach. Co., Chicago
*Caterpillar Tractor Co., San Leandro, Cal.
*Cleveland Tractor Co., Cleveland
*Good Roads Machinery Co., Kennett Sq., Pa.
*Rome Mfg. Co., Rome, N. Y.
*W. A. Riddell Co., Bucyrus, O.
Acme Road Machinery Co., Frankfort, N. Y.
J. D. Adams Co., Indianapolis
Bates Mfg. Co., Joliet, Ill.
Beach Mfg. Co., Charlotte, Mich.
Gallion Iron Works & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
Landreth Machinery Co., Joplin, Mo.
Shaw-Enochs Tractor Co., Minneapolis
Spears-Wells Machinery Co., Oakland, Cal.
Wehr Co., Milwaukee
Western Wheeled Scraper Co., Aurora, Ill.

ROAD MAINTAINERS, POWER

*Baker Mfg. Co., Springfield, Ill.
*Caterpillar Tractor Co., San Leandro, Cal.
*Cleveland Tractor Co., Cleveland
*Good Roads Machinery Co., Kennett Sq., Pa.
*Rome Mfg. Co., Rome, N. Y.
J. D. Adams Co., Indianapolis
Gallion Iron Works & Mfg. Co., Gallion, Ohio
Landreth Machinery Co., Joplin, Mo.
Ryan Mfg. Corp., Chicago
Shaw-Enochs Tractor Co., Minneapolis
Spears-Wells Machinery Co., Oakland, Cal.
Stockland Road Machinery Co., Minneapolis

ROAD OILS (See Oils, Road)

ROAD OILERS

*Austin-Western Road Machy. Co., Chicago
*E. D. Elyre & Co., Oregon, Ill.
*Good Roads Machy. Co., Kennett Sq., Pa.
*Chas. Hvass & Co., New York
Kinney Mfg. Co., Boston
Mack Trucks, Inc., New York
Municipal Supply Co., South Bend, Ind.
Spears-Wells Machinery Co., Oakland, Cal.
White Co., Cleveland

ROCK CRUSHERS AND PULVERIZERS (See Crushers)

ROCK DRILLS (See Drills, Rock)

ROLLERS, EMBANKMENT

*Buffalo-Springfield Roller Co., Springfield, O.
Acme Road Machy. Co., Frankfort, N. Y.
H. W. Rohl & Co., Los Angeles, Calif.

ROLLERS, ROAD AND PAVING

*Ames Iron Works, Oswego, N. Y.
*Austin-Western Road Machy. Co., Chicago
*Buffalo-Springfield Roller Co., Springfield, O.
*Good Roads Machinery Co., Kennett Sq., Pa.
*Hercules Co., Marion, O.
*Huber Mfg. Co., Marion, Ohio
Acme Road Machinery Co., Frankfort, N. Y.
Austin Mfg. Co., Chicago
Banting Mfg. Co., Toledo, O.
Barber Asphalt Co., Philadelphia
Beach Mfg. Co., Charlotte, Mich.
Erie Machine Shops, Erie, Pa.
Gallion Iron Works & Mfg. Co., Gallion, O.
Horst & Strietter Co., Davenport, Iowa
Kinney Standards, Inc., Brooklyn, N. Y.
Wehr Co., Milwaukee

ROOFING, ASBESTOS, ASPHALT, COMPOSITION, TILE, METAL, ETC.

*Phillip Carey Co., Cincinnati, O.
*Standard Oil Co. (Indiana), Chicago
*Truscon Steel Co., Youngstown, O.
American Cement Tile Mfg. Co., Pittsburgh
Atlantic Refining Co., Inc., Phila., Pa.
Barber Asphalt Co., Philadelphia, Pa.
Bird & Son, Inc., East Walpole, Mass.
Certain-teed Products Corp., New York
Chatfield Mfg. Co., Cincinnati, O.
Decatur Corncr & Roofing Co., Albany, Ala.
Edwards Mfg. Co., Cincinnati, O.
Flintkote Co., Boston
Headley Emulsified Prod. Co., Phila.
Intl. Comb. Tar & Chem. Corp., New York
Johns-Manville, Inc., New York
Keystone Roofing Mfg. Co., York, Pa.
The Lehon Co., Chicago
National Roofing Co., Tonawanda, N. Y.
National Sheet Metal Roofing Co., Jersey City, N. J.
W. F. Norman Sheet Metal Mfg. Co., Nevada, Mo.
Reeves Mfg. Co., Dover, O.
Ruberoil Co., New York
Silo Products Co., St. Paul, Minn.
L. Sonneborn & Sons, Inc., New York
Texas Co., New York
Western Kettlerite Roofing Co., Denver

ROOFING KETTLES (See Kettles)

ROPE, MANILA

American Mfg. Co., Brooklyn, N. Y.
Columbian Rope Co., Auburn, N. Y.
Cupples Cordage Co., Brooklyn, N. Y.
Hooven & Allison Co., Xenia, O.
R. A. Kelly Co., Xenia, O.
N. Bedford Cordage Co., N. Bedford, Mass.
Peoria Cordage Co., Peoria, Ill.
Plymouth Cordage Co., N. Plymouth, Mass.
Portland Cordage Co., Portland, Ore.
St. Louis Cordage Mills, St. Louis, Mo.
Tubbs Cordage Co., San Francisco
Wall Rope Works, New York
Waterbury Co., New York
Whitlock Cordage Co., New York

ROPE, WIRE, HOISTING, HAULAGE

*American Steel & Wire Co., Chicago
*Williamsport Wire Rope Co., Williamsport, Pa.
American Cable Co., Inc., New York
Broderick & Bascom Rope Co., St. Louis, Mo.
Fischer & Hayes Rope & Steel Co., Chicago
L. P. Green, Chicago
Hazard Wire Rope Co., Wilkes-Barre, Pa.
A. Leach & Sons Rope Co., St. Louis
Macwhirte Co., Kenosha, Wis.
Page Steel & Wire Co., Bridgeport, Conn.
J. A. Roebeling's Sons Co., Trenton, N. J.
Upson-Walton Co., Cleveland, Ohio
Wickwire Spencer Steel Co., New York

RUBBER TIRES (See Tires)

SALAMANDERS, OIL BURNING

*Littleford Brothers, Cincinnati, Ohio
Aerol Burner Co., West New York, N. J.
American Steel Wks., Kansas City, Mo.
Anchor Mfg. Co., Chicago
Hauck Mfg. Co., Brooklyn, N. Y.
Macloed Co., Cincinnati

SALAMANDERS, COKE OR WOOD BURNING

*General Wheelbarrow Co., Cleveland, Ohio
*Joseph Hornhorst Co., Cincinnati, Ohio
*Littleford Brothers, Cincinnati, Ohio
Jackson Mfg. Co., Harrisburg

SAFETY TREADS (See Treads, Safety)

SASH ROLLER STEEL (See Window Frames and Sash)

SAW HORSES

Cleveland Steel Specialty Corp., Cleveland, O.

SAW MILLS & ACCESSORIES

*American Saw Mill Machy. Co., Hackettstown, N. J.

SAW RIGS, PORTABLE

*American Saw Mill Machy. Co., Hackettstown, N. J.

*C. H. & E. Mfg. Co., Milwaukee
*Jones Superior Machine Co., Chicago
*John Lauson Mfg. Co., New Holstein, Wis.
De Walt Products Co., Leola, Pa.
Knickerbocker Co., Jackson, Mich.
Leach Co., Oshkosh, Wis.
Witte Engine Works, Kansas City, Mo.

SAWS, PORTABLE POWER

*Reed-Prentice Corp., Worcester, Mass.
*Tousley Tool Co., Cedar Rapids, Iowa
Ingersoll-Rand Co., New York
Michel Electric Hand Saw Co., Chicago
Portable Power Tool Corp., Warsaw, Ind.
Porter Cable Machinery Co., Syracuse
P. L. Rogers & Co., Chicago
Skilaw, Inc., Chicago, Ill.
Speedway Mfg. Co., Cicero, Ill.
Wappat Gear Works, Pittsburgh, Pa.
Witte Engine Works, Kansas City, Mo.

SCAFFOLDING, STEEL, ADJUSTABLE

*Toledo Pressed Steel Co., Toledo, Ohio

SCARIFIERS

*Austin-Western Road Machy. Co., Chicago
*Baker Mfg. Co., Springfield, Ill.
*Buffalo-Springfield Roller Co., Springfield, O.
*Caterpillar Tractor Co., San Leandro, Cal.
*Huber Mfg. Co., Marion, Ohio
*Chas. Hvass & Co., New York
*Rome Mfg. Co., Rome, N. Y.
*Wiard Plow Co., Batavia, N. Y.
Acme Road Machinery Co., Frankfort, N. Y.
Austin Mfg. Co., Chicago
Banting Mfg. Co., Toledo, Ohio
Gallion Iron Works & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
Killefer Mfg. Corp., Los Angeles
Klauser Mfg. Co., Dubuque, Iowa
Ryan Mfg. Corp., Chicago
Shaw-Enochs Tractor Co., Minneapolis
Universal Road Machy. Co., Kingston, N. Y.

SCARIFIERS, TEETH FOR

*Caterpillar Tractor Co., San Leandro, Cal.
Gallion Iron Works & Mfg. Co., Gallion, Ohio
Shunk Mfg. Co., Bucyrus, Ohio

SCOOPS, HORSE OR TRACTOR DRAWN

(See Scrapers Drag, Scrapers, Rotary and Scrapers, Wheeled)

SCOOPS, HAND (See Shovels, Spades and Scoops)

SCOOPS, SKIMMER AND TRENCH

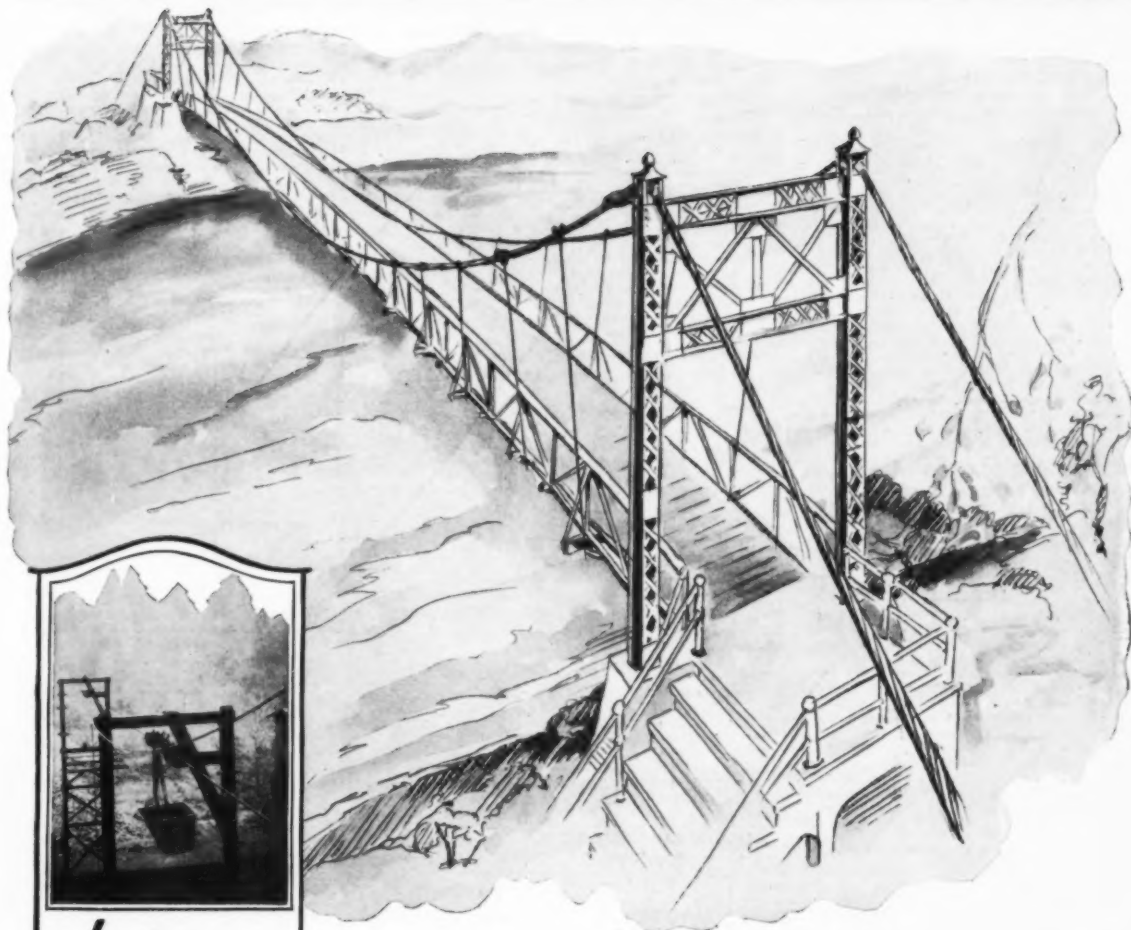
*Bay City Shovels, Inc., Bay City, Mich.
Keystone Driller Co., Beaver Falls, Pa.

SCRAPERS, FRESNO (See Scrapers, Rotary)

SCRAPERS, DRAGLINE

*Sauerman Bros., Chicago
American Manganese Steel Co., Chicago
Heights, Ill.
Beach Mfg. Co., Charlotte, Mich.
Browning Crane Co., Cleveland
Bucyrus-Erie Co., Erie, Pa.
Garst Mfg. Company, Chicago
Harnischfeger Corp., Milwaukee
Link-Belt Co., Chicago
Monaghan Machine Co., Chicago
Pag. Engineering Co., Chicago
Western Wheeled Scraper Co., Aurora, Ill.

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WHERE TO PURCHASE

SCRAPERS, POWER DRAG

- *Highway Trailer Co., Edgerton, Wis.
- *Sauerman Bros., Chicago
- *Schofield-Burkett Constr. Co., Macon, Ga.
- *Beach Mfg. Co., Charlotte, Mich.
- *Beaumont Mfg. Co., Philadelphia
- *Garst Mfg. Co., Chicago
- *L. P. Green, Chicago
- *Link-Belt Co., Chicago
- *Shaw Exc. & Tools Co., Worthington, O.

SCRAPERS, ROAD (See also Drags, Road)

- *Rome Mfg. Co., Rome, N. Y.
- *Root Spring Scraper Co., Kalamazoo, Mich.

SCRAPERS, ROTARY

- *Austin-Western Road Machinery Co., Chicago
- *Baker Mfg. Co., Springfield, Ill.
- *Euclid Crane & Hoist Co., Euclid Village, O.
- *General Wheelbarrow Co., Cleveland
- *Hodrick Loan Co., Mansfield, Ohio
- *Gustav Schaefer Co., Cleveland, Ohio
- *Ward Plov Co., Batavia, N. Y.
- *J. D. Adams Co., Indianapolis, Ind.
- *American Steel Scraper Co., Sidney, Ohio
- *Atlas Scraper Co., Los Angeles, Calif.
- *Beach Mfg. Co., Charlotte, Mich.
- *Case Crane & Eng'g Co., Columbus, Ohio
- *Gallon Iron Works & Mfg. Co., Gallon, O.
- *Kiefer Mfg. Corp., Los Angeles
- *Miskin Scraper Works Co., Ucon, Idaho
- *Ryan Mfg. Corp., Chicago
- *H. C. Shaw Co., Stockton, Calif.
- *Slusser-McLean Scraper Co., Sidney, Ohio
- *Solano Iron Works, Berkeley, Calif.
- *Western Wheeled Scraper Co., Aurora, Ill.

SCRAPERS, SELF-LOADING (See Scrapers, Rotary and Scrapers, Wheeled)

SCRAPERS, WHEELED

- *Austin-Western Road Machinery Co., Chicago
- *Baker Mfg. Co., Springfield, Ill.
- *Euclid Crane & Hoist Co., Euclid Village, O.
- *General Wheelbarrow Co., Cleveland
- *W. A. Biddell Co., Bucyrus, Ohio
- *Acme Road Machy. Co., Frankfort, N. Y.
- *J. D. Adams Co., Indianapolis, Ind.
- *American Steel Scraper Co., Sidney, Ohio
- *Atlas Scraper Co., Los Angeles, Calif.
- *Beach Mfg. Co., Charlotte, Mich.
- *Case Crane & Eng'g Co., Columbus, Ohio
- *Gallon Iron Works & Mfg. Co., Gallon, Ohio
- *Miami Trailer Scraper Co., Troy, Ohio
- *Miskin Scraper Wks., Ucon, Idaho
- *Ryan Mfg. Corp., Chicago
- *Shaw Exc. & Tools Co., Worthington, O.
- *Sidney Steel Scraper Co., Sidney, Ohio
- *Slusser-McLean Scraper Co., Sidney, Ohio
- *Stockland Road Machy. Co., Minneapolis, Minn.
- *Western Wheeled Scraper Co., Aurora, Ill.

SCREENS, SAND, GRAVEL AND COAL

- *Allis-Chalmers Mfg. Co., Milwaukee
- *Austin-Western Road Machinery Co., Chicago
- *Chicago Automatic Conv. Co., Chicago
- *Good Roads Machinery Co., Kennett Sq., Pa.
- *Littleford Bros., Cincinnati, Ohio
- *New England Road Machy. Co., So. Boston
- *Acme Road Machinery Co., Frankfort, N. Y.
- *Atlas Engineering Co., Clintonville, Wis.
- *Austin Mfg. Co., Chicago
- *C. O. Bartlett & Snow Co., Cleveland, Ohio
- *Beach Mfg. Co., Charlotte, Mich.
- *Deister Concentrator Co., Ft. Wayne, Ind.
- *Gallon Iron Works & Mfg. Co., Gallon, Ohio
- *Gifford-Wood Co., Hudson, N. Y.
- *L. P. Green, Chicago
- *Geo. Haisa Mfg. Co., New York
- *Hendrick Mfg. Co., Carbondale, Ohio
- *Jeffrey Mfg. Co., Columbus, Ohio
- *Link-Belt Co., Chicago
- *Morrow Mfg. Co., Wellston, Ohio
- *Newage Engineering Co., Newage, Mich.
- *New Holland Mach. Co., New Holland, Pa.
- *New Jersey Wire Cloth Co., Trenton, N. J.
- *Robins Conv. Belt Co., New York
- *H. B. Sackett Screen & Chute Co., Chicago
- *Smith Engineering Works, Milwaukee, Wis.
- *Sturtevant Mill Co., Boston
- *Superior Eng. Co., Warren, O.
- *Universal Crusher Co., Cedar Rapids, Iowa
- *Universal Road Machine Co., Kingston, N. Y.
- *Webster Mfg. Co., Chicago
- *Weller Mfg. Co., Chicago
- *Wickwire Spencer Steel Co., New York

SCREENS, SEWAGE

- *Dorr Co., New York
- *Green Bay Fdry. & Mach. Wks., Green Bay, Wis.
- *Link-Belt Co., Chicago
- *Simplex Ejector & Aerator Corp., Chicago

SEWAGE DISINFECTANT

- *Wallace & Tiernan Co., Inc., Newark, N. J.
- *Paradon Mfg. Co., Arlington, N. J.

SEWAGE DISPOSAL APPARATUS

- *Dorr Co., New York
- *Link-Belt Co., Chicago
- *Pacific Flush Tank Co., Chicago and N. Y.
- *Simplex Ejector & Aerator Corp., Chicago

SEWAGE EJECTORS

- *Pacific Flush Tank Co., Chicago and N. Y.
- *Simplex Ejector & Aerator Corp., Chicago
- *Yeomans Bros. Co., Chicago

SEWAGE PUMPS (See Pumps)

SEWER BLOCKS, SEGMENT

- *American Vit. Products Co., Akron, Ohio
- *Cannelton Sewer Pipe Co., Cannelton, Ind.
- *Denver Sewer Pipe & Clay Co., Denver, Col.
- *W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
- *Evans & Howard Fire Brick Co., St. Louis, Mo.
- *Laclede Christy Clay Prod. Co., St. Louis, Mo.
- *Macomb Sewer Pipe Works, Macomb, Ill.
- *Pacific Clay Products Co., Los Angeles, Cal.
- *Red Wing Sewer Pipe Co., Red Wing, Minn.
- *Robinson Clay Products Co., Akron, Ohio
- *Standard Fire Brick & Sewer Pipe Co., Pueblo, Col.

SEWER BRACES

- *Templeton, Kenly & Co., Chicago

SEWER CLEANING APPARATUS

- *Champion Corp., Hammond, Ind.
- *Hopes Sewer Root Cutter Co., Freeport, Ill.
- *Self Propelling Nozzle Co., New York
- *Turbine Sewer Machine Co., Milwaukee
- *Westinghouse Elec. Sup. Co., F. Bissell Div., Toledo

SEWER PIPE AND DRAINS

- *Armco Culvert Mfrs. Assn., Middletown, Ohio
- *American Vit. Products Co., Akron, Ohio
- *Blackmer & Post Pipe Co., St. Louis
- *William E. Des Co., Chicago
- *Denver Sewer Pipe & Clay Co., Denver, Colo.
- *W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
- *Evans & Howard Fire Brick Co., St. Louis
- *Logan Clay Products Co., Logan, Ohio
- *Ohio Vit. Pipe Co., Uhrichsville, Ohio
- *Patton Clay Mfg. Co., Patton, Pa.
- *Red Wing Sewer Pipe Co., Red Wing, Minn.
- *Ric-wil Co., Cleveland
- *Robinson Clay Prod. Co., Akron, Ohio
- *Streator Clay Mfg. Co., Streator, Ill.

SEWER PIPE FORMS (See Forms, Concrete Pipe)

SEWER PIPE JOINT COMPOUNDS

- *Servicised Premoulded Products, Chicago
- *Atlas Mineral Prod. Co., Meritown, Pa.
- *Pacific Flush Tank Co., Chicago and N. Y.
- *Ruberoid Co., New York
- *Prestatite Engg. Co., St. Louis
- *Ric-wil Co., Cleveland

SEWER ROBS

- *Champion Corp., Hammond, Ind.
- *Turbine Sewer Machine Co., Milwaukee
- *Westinghouse Elec. Sup. Co., F. Bissell Div., Toledo

SHARPENERS, DRILL STEEL

- *Sullivan Machinery Co., Chicago
- *Gardner-Denver Co., Quincy, Ill.
- *Hardsocq Wonder Drill Co., Ottumwa, Iowa
- *Ingersoll-Rand Co., New York

SHORES

- *Cleveland Wheelbarrow Co., Cleveland
- *Concrete Engineering Co., Omaha, Neb.
- *Dayton Sure Grip & Shore Co., Dayton, Ohio
- *Fischer & Hayes Rope & Steel Co., Chicago
- *M. & M. Wire Clamp Co., Minneapolis
- *The O. D. Co., Owensboro, Ky.
- *H. W. Roos Co., Cincinnati, Ohio
- *Roos-Meyer-Hecht Co., Cincinnati, Ohio
- *Symons Clamp & Mfg. Co., Chicago
- *Universal Form Clamp Co., Chicago

SHOULDER FINISHING MACHINES

- *Morris-Bennett Corp., Birmingham, Ill.

SHOVELS, CRAWLER TRACTOR

- *General Excavator Co., Marion, Ohio
- *Industrial Brownhoist Corp., Cleveland
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *Speeder Mch. Corp., Cedar Rapids, Iowa
- *Thew Shovel Co., Lorain, Ohio
- *Trackson Co., Milwaukee
- *Universal Crane Co., Lorain, O.

- *American Hoist & Derrick Co., St. Paul
- *Browning Crane Co., Cleveland
- *Bucyrus-Erie Co., Erie, Pa.
- *Harnischfeger Corp., Milwaukee
- *Link-Belt Co., Chicago
- *Northwest Engg. Wks., Chicago
- *Ohio Power Shovel Co., Lima, O.

SHOVELS, ELECTRIC

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, O.
- *Industrial Brownhoist Corp., Cleveland
- *Koehring Co., Milwaukee, Wis.
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *Osgood Company, Marion, Ohio
- *Speeder Mch. Corp., Cedar Rapids, Iowa
- *Thew Shovel Co., Lorain, Ohio
- *American Hoist & Derrick Co., St. Paul
- *Bucyrus-Erie Co., Erie, Pa.
- *Byers Mach. Co., Ravenna, Ohio
- *Harnischfeger Corp., Milwaukee
- *Link-Belt Co., Chicago
- *Marion Steam Shovel Co., Marion, Ohio
- *Northwest Engg. Wks., Chicago
- *Ohio Power Shovel Co., Lima, O.

SHOVELS, GASOLINE

- *Bay City Shovels, Inc., Bay City, Mich.
- *General Excavator Co., Marion, Ohio
- *Industrial Brownhoist Corp., Cleveland
- *Inley Mfg. Co., Indianapolis
- *Koehring Co., Milwaukee, Wis.
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *Osgood Company, Marion, Ohio
- *Speeder Mch. Corp., Cedar Rapids, Iowa
- *Thew Shovel Co., Lorain, Ohio
- *Trackson Co., Milwaukee
- *American Hoist & Derrick Co., St. Paul
- *Bucyrus-Erie Co., Erie, Pa.
- *Byers Mach. Co., Ravenna, Ohio
- *Harnischfeger Corp., Milwaukee
- *Keystone Driller Co., Beaver Falls, Pa.
- *Link-Belt Co., Chicago
- *Marion Steam Shovel Co., Marion, Ohio
- *McMyler Interstate Co., Cleveland, Ohio
- *Mead-Morrison Mfg. Co., Boston
- *Northwest Engineering Works, Chicago
- *Ohio Power Shovel Co., Lima, O.
- *Orton Crane & Shovel Co., Chicago
- *Star Drilling Machine Co., Akron, Ohio
- *Universal Power Shovel Co., Highland Park, Mich.

SHOVELS, STEAM

- *Industrial Brownhoist Corp., Cleveland
- *Manitowoc Engg. Wks., Manitowoc, Wis.
- *Osgood Company, Marion, Ohio
- *Thew Shovel Co., Lorain, Ohio
- *American Hoist & Derrick Co., St. Paul
- *Bucyrus-Erie Co., Erie, Pa.
- *Keystone Driller Co., Beaver Falls, Pa.
- *Marion Steam Shovel Co., Marion, Ohio
- *Orton Crane & Shovel Co., Chicago

SHOVELS, SPADES AND SCOOPS

- *American Mfg. Co., Chattanooga, Tenn.
- *Ames Shovel & Tool Co., Boston
- *Baldwin Tool Works, Parkersburg, W. Va.
- *Beall Bros. Co., Alton, Ill.
- *Conneaut Shovel Co., Conneaut, Ohio
- *Indiana Shovel Co., New Castle, Ind.
- *Jackson Shovel Co., Montpelier, Ind.
- *Pittsburgh Shovel Co., Pittsburgh, Pa.
- *Wood Shovel & Tool Co., Piqua, Ohio
- *Wyoming Shovel Works, Wyoming, Pa.

SIDEWALK AND ROAD FORMS (See Forms, Concrete)

SIGNS, STREET AND HIGHWAY

- *Almoyd Sign & Signal Co., Chicago
- *Auto Sign Display Co. of Missouri, St. Louis, Mo.
- *Baltimore Enamel & Novelty Co., Baltimore
- *Evernu-Century Sign Co., Boston
- *Horn Signal Mfg. Corp., New York
- *Ingram-Richardson Mfg. Co., Beaver Falls, Pa.
- *A. D. Joslin Mfg. Co., Manistee, Mich.
- *Lyle-Signs, Minneapolis, Minn.
- *Municipal Street Sign Co., New York
- *Niles Machine Co., Lebanon, N. H.
- *Persona-Majestic Mfg. Co., Worcester, Mass.
- *Redflex Signal Co., Cleveland, Ohio
- *Rochester Street Signal Co., Rochester, N. Y.
- *Standard Mfg. Co., Cedar Falls, Iowa
- *Traffic Equip. Corp., New York
- *Union Iron Products Co., E. Chicago, Ind.
- *Western Stamping & Mfg. Co., Cleveland

SIRENS (See Fire Alarm Sirens)

SLEEVES, TAPPING AND VALVE

- *Darling Valve & Mfg. Co., Williamsport, Pa.
- *Mich. Valve & Fdry. Co., Detroit
- *Mueller Company, Decatur, Ill.
- *Rensselaer Valve Co., Troy, N. Y.
- *A. P. Smith Mfg. Co., East Orange, N. J.

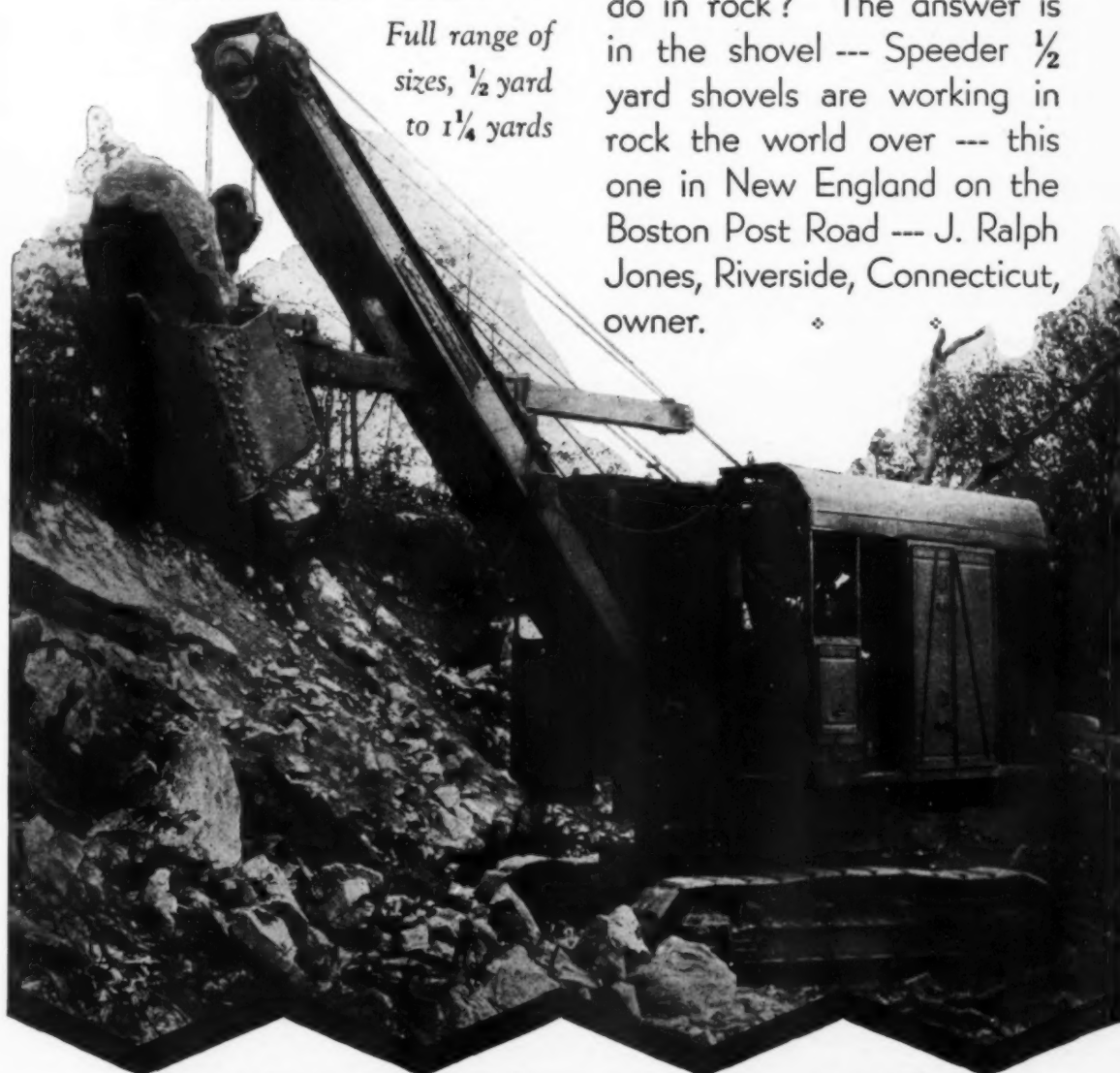


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WHERE TO PURCHASE

SLUICE GATES (See Gates, Sluice)

SMOKE STACKS (See Chimneys, Steel)

SNOW FENCING

- *Good Roads Machinery Co., Kennett Sq., Pa.
- Illinois Wire & Mfg. Co., Joliet, Ill.
- Wickwire-Spencer Steel Co., New York

SNOW REMOVAL MACHINERY

- *Allis-Chalmers Mfg. Co., Springfield, Ill.
- *Austin-Western Road Machinery Co., Chicago
- *Baker Mfg. Co., Springfield, Ill.
- *Barber-Greene Co., Aurora, Ill.
- *Caterpillar Tractor Co., San Leandro, Cal.
- *Cleveland Tractor Co., Cleveland, Ohio
- *Empire Flow Co., Cleveland
- *Good Roads Machinery Co., Kennett Sq., Pa.
- *M. F. Nelson Iron Works, Passaic, N. J.
- *New England Road Machy. Co., Boston
- *W. A. Riddell Co., Bucyrus, Ohio
- *Trackson Co., Milwaukee, Wis.
- J. D. Adams Co., Indianapolis
- Austin Mfg. Co., Chicago
- Batavia Steel Plate Constn. Co., Batavia, N. Y.
- Byers Mach. Co., Ravenna, Ohio
- Clark Tractor Co., Battle Creek, Mich.
- Fox Rotary Snow Broom Co., New York
- Carl H. Frink, Clayton, Thousand Islands, N. Y.
- Geo. Halsas Mfg. Co., New York
- The Heil Company, Milwaukee, Wis.
- Killefer Mfg. Co., Los Angeles, Calif.
- Klausner Mfg. Co., Dubuque, Iowa
- LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa
- Mack Trucks, Inc., New York
- Maine Steel Products Co., So. Portland, Me.
- Mead-Morrison Mfg. Co., E. Boston
- Owensboro Ditcher & Grader Co., Owensboro, Ky.
- Root Spring Scraper Co., Kalamazoo, Mich.
- Rotary Snow Plow Co., Minneapolis
- Ryan Mfg. Corp., Chicago
- Shaw-Enochs Tractor Co., Minneapolis
- Walsh's Holyoke St. Bldg. Works, Holyoke, Mass.
- Walter Motor Truck Co., L. I. City, N. Y.
- Wausau Iron Wks., Wausau, Wis.

SPADES (See Shovels)

SPRAYERS, ASPHALT AND TAR

- *Chas. Hvass & Co., New York
- *Littleford Bros., Cincinnati
- Kinney Mfg. Co., Boston

SPRAYING MACHINERY FOR TREES

- John Bean Mfg. Co., Lansing, Mich.
- Deming Co., Salem, Ohio
- Field Force Pump Co., Elmira, N. Y.
- Fitzhenry-Guptill Co., E. Cambridge, Mass.
- Friend Mfg. Co., Gasport, N. Y.
- Hardie Mfg. Co., Hudson, Mich.

SPRAY PAINTING MACHINERY (See Painting Machinery)

SREADERS, SAND

- *Good Roads Machy. Co., Kennett Square, Pa.
- *Chas. Hvass & Co., New York
- Goroco Mechanical Spreader Co., Philadelphia
- Highway Services Co., New Bedford, Mass.
- Tarrant Co., Saratoga Springs, N. Y.
- Warren Bros. Co., Boston, Mass.

SREADERS, STONE

- *Austin-Western Road Machinery Co., Chicago
- *The Burch Corp., Crestline, Ohio
- *Chas. Hvass & Co., New York
- Gallon Iron Works & Mfg. Co., Gallon, Ohio
- Highway Services Co., New Bedford, Mass.
- Universal Road Machinery Co., Kingston, N.Y.

STACKS, STEEL

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Connery & Co. Inc., Philadelphia
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- *Jos. Honhorst Co., Cincinnati, Ohio
- Birmingham Tank Co., Birmingham, Ala.
- Canton Art Metal Co., Canton, Ohio
- Chattanooga Boiler & Tank Co., Chattanooga, Tenn.
- Chicago Bridge & Iron Works, Chicago
- Graver Corp., Chicago
- Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
- Lancaster Iron Works, Lancaster, Pa.
- New York Central Iron Works Co., Inc., Hagerstown, Md.
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- W. B. Scaife & Sons, Pittsburgh, Pa.
- Tippett & Wood, Phillipsburg, Pa.

STANDPIPES AND ELEVATED TANKS

- W. E. Caldwell Co., Louisville, Ky.
- Chatta. Bldg. & Tank Co., Chattanooga, Tenn.
- Chicago Bridge & Iron Works, Chicago
- R. D. Cole Mfg. Co., Newnan, Ga.
- Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
- Lancaster Iron Works, Lancaster, Pa.
- Pacific Tank & Pipe Co., San Francisco
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- J. S. Schofield's Sons Co., Macon, Ga.
- Tippett & Wood, Phillipsburg, Pa.
- United Iron Works, Inc., Kansas City, Mo.
- W. S. Wind Eng. & Pump Co., Batavia, Ill.

STEAM SHOVELS (See Shovels, Steam)

STEEL DRILLS, HOLLOW

- *Swedish-American Steel Corp., Brooklyn, N. Y.

STEEL PLATE CONSTRUCTION

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Connery & Co., Philadelphia
- *Heltzel Steel Form & Iron Co., Warren, Ohio
- *Joseph Honhorst Co., Cincinnati, Ohio
- *Littleford Bros., Cincinnati, Ohio
- *Union Iron Works, Hoboken, N. J.
- Bethlehem Steel Co., Bethlehem, Pa.
- Biggs Boiler Works, Akron, Ohio
- Birmingham Tank Co., Birmingham, Ala.
- Chatta. Boiler & Tank Co., Chattanooga, Tenn.
- Chicago Bridge & Iron Works, Chicago
- Graver Corp., East Chicago, Ind.
- Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
- Heil Co., Milwaukee, Wis.
- Hendrick Mfg. Co., Carbondale, Pa.
- Lancaster Iron Works, Lancaster, Pa.
- McClintic-Marshall Co., Pittsburgh, Pa.
- New York Central Iron Works Co., Inc., Hagerstown, Md.
- Pennsylvania Bridge Co., Beaver Falls, Iowa
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- W. B. Scaife & Sons, Pittsburgh, Pa.

STEEL SHEET PILING

- *S. W. Lindheimer, Chicago
- *Wemlinger, Inc., New York

STEEL TOWERS, CONCRETE

- *Insley Mfg. Co., Indianapolis, Ind.
- *Lakewood Engr. Co., Cleveland, O.
- *Ransome Conc. Machinery Co., Dunellen, N. J.

STOKERS, MECHANICAL

- Babcock & Wilcox Co., New York
- Dayton Stoker Co., Dayton, Ohio
- Detroit Stoker Co., Detroit
- Sanford Riley Stoker Co., Worcester, Mass.
- Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

STREET AND ROAD SIGNS (See Signs)

STREET BROOMS

- *Chas. Hvass & Co., New York
- Kendallville Brush & Broom Co., Kendallville, Ind.
- Joseph Lay Co., Portland, Ind.
- Osborn Mfg. Co., Cleveland, Ohio

STREET CLEANERS' CARTS

- *Chas. Hvass & Co., New York
- Durlach Can & Iron Works, Brooklyn, N. Y.
- Rochester Can Co., Rochester, N. Y.
- Tarrant Mfg. Co., Saratoga Springs, N. Y.

STREET FLUSHERS AND SPRINKLERS

- *Austin-Western Road Machy. Co., Chicago
- *Charles Hvass & Co., New York
- *E. D. Etnyre & Co., Oregon, Ill.
- Austin Mfg. Co., Chicago
- Autocar Co., Ardmore, Pa.
- Federal Motor Truck Co., Detroit
- General Motors Truck Co., Chicago
- Heil Co., Milwaukee, Wis.
- Kinney Mfg. Co., Boston
- Mack Trucks, Inc., New York
- Municipal Supply Co., South Bend, Ind.
- White Co., Cleveland, Ohio
- Whitehead & Kales Co., Detroit

STREET LIGHTING EQUIPMENT

- American Conc. Marbleite Co., Forest Park, Ill.
- J. B. Clow & Sons, Chicago
- Electric Ry. Equipment Co., Cincinnati, Ohio
- Graybar Electric Co., New York
- Holophane Co., New York
- Line Material Co., So. Milwaukee, Wis.
- J. S. Schofield's Sons Co., Macon, Ga.
- Union Metal Mfg. Co., Canton, Ohio
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

STREET SIGNS (See Signs, Street)

STREET SWEEPERS

- *Austin-Western Road Machy. Co., Chicago
- *Chas. Hvass & Co., New York
- Acme Road Machy. Co., Frankfort, N. Y.
- Austin Mfg. Co., Chicago
- Butler Mfg. Co., Cleveland, Ohio
- Elgin Corp., New York
- Kinney Mfg. Co., Boston
- Whitehead & Kales Co., Detroit

STREET SWEEPER BROOMS REPLIED

- *Chas. Hvass & Co., New York
- Kendallville Brush & Broom Co., Kendallville, Ind.
- Joseph Lay Co., Portland, Ind.
- Osborn Mfg. Co., Cleveland, Ohio
- Standard Brush & Broom Mfg. Co., Chicago

STUMP PULLERS

- *Beebe Bros., Inc., Seattle, Wash.
- *Sagen Derrick Co., Chicago
- H. L. Bennett & Co., Westerville, Ohio
- Ersted Mfg. Co., Portland, Ore.
- John Waldron Corp., New Brunswick, N. J.

SUBGRADING MACHINES

- *Blaw-Knox Co., Pittsburgh, Pa.
- *Koehring Co., Milwaukee
- *Lakewood Engr. Co., Cleveland, Ohio
- Ted Carr & Co., Chicago
- The Hug Co., Highland, Ill.

SURFACERS & GRINDERS, CONCRETE

- *Concrete Surfacing Machy. Co., Cincinnati
- *Tonsley Tool Co., Cleveland
- Chicago Pneumatic Tool Co., New York
- Cleveland Pneumatic Tool Co., Cleveland
- The Dallett Co., Philadelphia
- Ingersoll-Rand Co., New York

SURVEYORS' INSTRUMENTS (See Instruments)

SWITCHBOARDS

- *Allis-Chalmers Mfg. Co., Milwaukee
- General Electric Co., Schenectady, N. Y.
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TAMPERS, PNEUMATIC

- *Independent Pneumatic Tool Co., Chicago
- Chicago Pneumatic Tool Co., New York
- Cleveland Pneumatic Tool Co., Cleveland, O.
- Cleveland Rock Drill Co., Cleveland
- Ingersoll-Rand Co., New York

TAMPING MACHINES, CONCRETE BLOCK

- Cement Block Machinery Co., Newark, N. J.

TANKS, AIR COMPRESSOR

- *Connery & Co., Inc., Philadelphia
- Biggs Boiler Works, Akron, Ohio
- Birmingham Tank Co., Birmingham, Ala.
- Chicago Pneumatic Tool Co., New York
- Curtis Pneu. Mch. Co., St. Louis, Mo.
- Gardner-Denver Co., Quincy, Ill.
- Graver Corp., East Chicago, Ind.
- Heil Co., Milwaukee, Wis.
- Indiana Pump & Compr. Co., Indianapolis
- Ingersoll-Rand Co., New York
- Lancaster Iron Works, Lancaster, Pa.
- Nagle Engine & Boiler Works, Erie, Pa.
- National Tube Co., Pittsburgh, Pa.
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- W. B. Scaife & Sons, Pittsburgh, Pa.
- Westinghouse Tract. Brake Co., Wilmerding, Pa.
- Worthington Pump & Mch. Co., New York

TANKS, STEEL

- *Columbian St. Tank Co., Kansas City, Mo.
- *Connery & Co., Philadelphia
- *Joseph Honhorst Co., Cincinnati, Ohio
- *Chas. Hvass & Co., New York
- *Littleford Bros., Cincinnati, Ohio
- Biggs Boiler Works, Akron, Ohio
- Birmingham Tank Co., Birmingham, Ala.
- S. F. Bowser & Co., Inc., Ft. Wayne, Ind.
- Burnham Boiler Corp., Irvington, N. Y.
- Butler Mfg. Co., Minneapolis, Minn.
- J. I. Case Threshing Machine Co., Racine, Wis.
- W. E. Caldwell Co., Louisville, Ky.
- Canton Art Metal Co., Canton, Ohio
- Chattanooga Boiler & Tank Co., Chattanooga, Tenn.
- Chicago Bridge & Iron Works, Chicago
- Dover Boiler Works, New York
- Farrell Mfg. Co., Joliet, Ill.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover. *

Repeat Orders—

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Highest Stamp of Approval on the

MULTI FOOTE PAVER



Result of 26 Years of Constructive Engineering

Built by Specialists in the Paving Mixer Industry for the most severe tests of Road Paving. Dependable for Mile-after-Mile, Day-after-Day, Steady, Uniform Service.

Become a MultiFoote User—Understand why many of the largest and most successful Contractors continue to buy MultiFootes.

Refinements, without sacrificing strength. Strength, without accumulating weight. Mechanical Operations, without complicating mechanism. Simple, but complete in every detail.

NO PRESSURE WATER TANK

—An open-top auxiliary supply tank delivers water to the Multi-Foote Measuring Tank but without pressure. It is the simplest and most dependable system for accurate water control.

THE POWER BOOM SWING

—This new equipment speeds the handling of each batch and so gains yardage each day.

THE POWER OPERATOR—A

time saver. Allowing the Operator ample time for full supervision.

HERCULES HEAVY DUTY

GASOLINE ENGINE—It handles all operations with ample power.

THE FOOTE COMPANY, Inc., NUNDA, N. Y.

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167th & Sedgwick Ave., New York City
MULTIFOOTE SALES CO.
2811 W. Fulton Street, Chicago, Illinois
WILCOX BROS.
588 Chenango Street, Binghamton, N. Y.

E. J. McHARG & CO.
31 Crestmont Road, Binghamton, N. Y.
BURTON FRANKLIN COMPANY
Manufacturers Bldg., Chattanooga, Tenn.
EDW. R. BACON CO.
Folsom at 17th St., San Francisco, Calif.

CLYDE EQUIPMENT CO.
555 Thurman Street, Portland, Oregon
C. H. JONES COMPANY
134 Pierpont Ave., Salt Lake City, Utah
LONDON CONCRETE MACHINERY CO.
London, Ontario, Canada

World's Largest Exclusive Builders of Road Paver

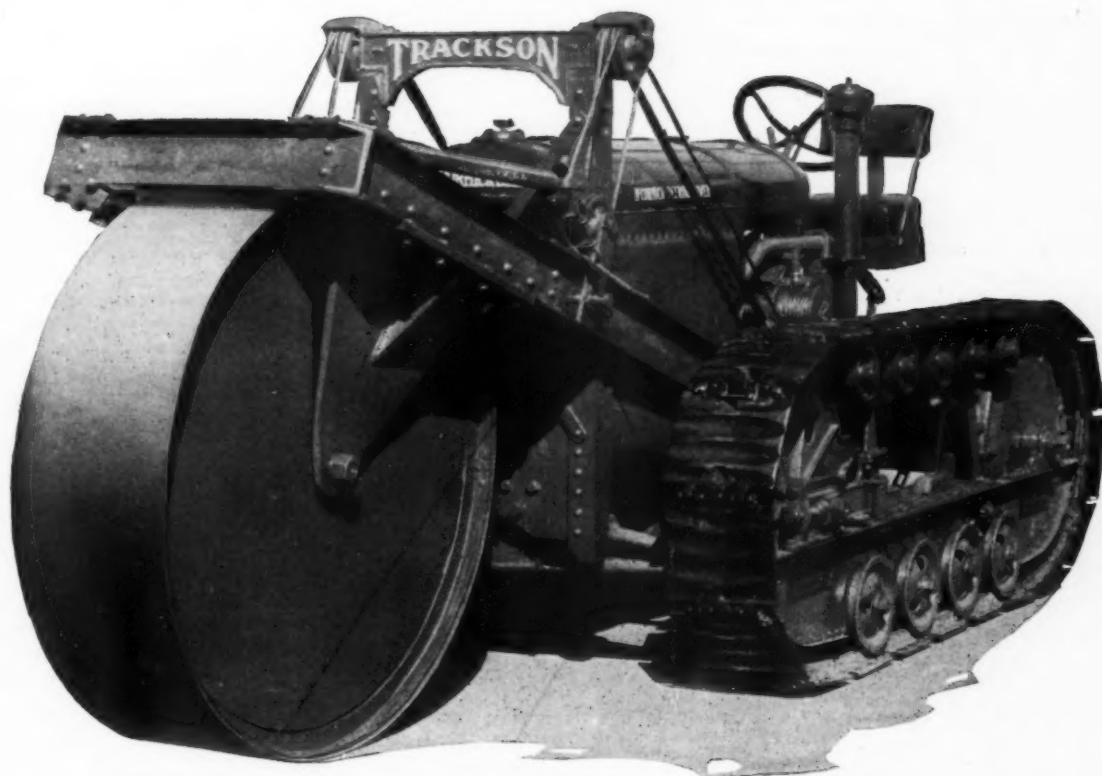
Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.

WHERE TO PURCHASE

- C. C. Fouts Co.**, Middletown, Ohio
Graver Corp., E. Chicago, Ind.
R. Hardesty Mfg. Co., Denver, Colo.
Hell Co., Milwaukee, Wis.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Hendrick Mfg. Co., Carbondale, Pa.
Lancaster Iron Works, Lancaster, Pa.
McClintic-Marshall Co., Pittsburgh
Nagle Eng. & Boiler Works, Erie, Pa.
New York Central Iron Works Co., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Road Supply & Metal Co., Topeka, Kans.
W. B. Scaife & Sons, Pittsburgh
United Iron Works, Inc., Kansas City, Mo.
- TANKS, WOOD**
W. E. Caldwell Co., Louisville, Ky.
G. M. Davis & Son, Palatka, Fla.
Eagle Tank Co., Chicago
Hauser-Stander Tank Co., Cincinnati, Ohio
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
National Tank & Pipe Co., Portland, Ore.
Pacific Tank & Pipe Co., San Francisco
Redwood Mfrs. Co., San Francisco
A. T. Stearns Lumber Co., Boston
U. S. Wind Eng. & Pump Co., Batavia, Ill.
Wendnagel & Co., Chicago
- TAPES, STEEL AND METALLIC**
Eugene Dietzen Co., New York
Keuffel & Esser Co., Hoboken, N. J.
Lofkin Rule Co., Saginaw, Mich.
The L. S. Starrett Co., Athol, Mass.
- TAR**
Barrett Co., New York
American Tar Products Co., Pittsburgh, Pa.
- TAR KETTLES (See Kettles)**
- TARPAULINS**
Fulton Bag & Cotton Mills, Atlanta, Ga.
- TENTS**
Fulton Bag & Cotton Mills, Atlanta, Ga.
- TESTING LABORATORIES**
Fatzig Testing Laboratories, Des Moines, Ia.
Allentown Testing Laboratory, Allentown, Pa.
E. L. Conwell & Co., Philadelphia
Robt. W. Hunt Co., Chicago
New York Testing Lab., New York
Pittsburgh Testing Lab., Pittsburgh
- THAWING OUTFITS**
Chausse Oil Burner Co., Elkhart, Ind.
Littleford Bros., Cincinnati
Aerol Burner Co., West New York, N. J.
Hauck Mfg. Co., Brooklyn, N. Y.
- TIES, STEEL**
Carnegie Steel Co., Pittsburgh, Pa.
International Steel Tie Co., Cleveland, O.
Koppel Ind. Car & Equipment Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.
- TIRES, RUBBER (For Motor Trucks)**
Firestone Tire & Rubber Co., Akron, O.
Fisk Tire Co., Chicopee Falls, Mass.
B. F. Goodrich Rubber Co., Akron, Ohio
Goodyear Tire & Rubber Co., Akron, O.
Kelly Springfield Tire Co., New York
U. S. Tire Co., New York
- TOOL HOUSES, PORTABLE STEEL**
Blaw-Knox Co., Pittsburgh, Pa.
Littleford Bros., Cincinnati, Ohio
- TORCHES, OIL HEATING**
Chausse Oil Burner Co., Elkhart, Ind.
Connelly & Co., Philadelphia, Pa.
Littleford Bros., Cincinnati
American Steel Wks., Kansas City, Mo.
Hauck Mfg. Co., Brooklyn, N. Y.
Hoosier Paint Works, Ft. Wayne, Ind.
Mead-Morrison Mfg. Co., East Boston, Mass.
Bewall Paint & Varnish Co., Kansas City, Mo.
- TORCHES, WELDING**
Toledo Pressed Steel Co., Toledo, Ohio
R. E. Dietz Co., New York
McCloskey Torch Co., Toledo, Ohio
- TOWERS (See Standpipes and Elevated Tanks)**
- TRACTS, INDUSTRIAL AND PORTABLE**
Lakewood Eng. Co., Cleveland, O.
Atlas Car & Mfg. Co., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Foundry & Mfg. Co., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
O. W. Hunt Co., Inc., W. N. Brighton, N. Y.
Koppel Ind. Car & Equipment Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.
- TRACTION TREADS (See Treads, Traction)**
- TRACTORS**
Allis-Chalmers Mfg. Co., Milwaukee
Caterpillar Tractor Co., San Leandro, Calif.
Cleveland Tractor Co., Cleveland, O.
Huber Mfg. Co., Marion, O.
International Harvester Co., Chicago
John Lauson Co., New Holstein, Wis.
W. A. Biddell Co., Bucyrus, Ohio
Rogers Bros. Corp., Albion, Pa.
United Tractor & Equipment Corp., Chicago
Advance-Rumely Thresher Co., Laporte, Ind.
Atlas Engineering Co., Clintonville, Wis.
Autocar Co., Ardmore, Pa.
Bates Mfg. Co., Joliet, Ill.
J. I. Case Threshing Machine Co., Racine, Wis.
Clark Tractor Co., Battle Creek, Mich.
Electric Wheel Co., Quincy, Ill.
Emerson-Brantingham, Rockford, Ill.
Four Drive Tractor Co., South Bend, Ind.
Hart-Parr Co., Charles City, Ia.
Lombard Tractor & Truck Corporation, N. Y.
Mead-Morrison Mfg. Co., E. Boston
Minneapolis-Moline Power Imp. Co., Minneapolis
Stockland Road Machy. Co., Minneapolis
Wehr Co., Milwaukee
- TRACTOR HITCHES**
Gustav Schaefer Co., Cleveland
Trail-T Co., St. Paul, Minn.
Whitehead & Kales Co., Detroit
- TRACTOR LUBRICANTS**
D-A Lubricant Co., Inc., Indianapolis, Ind.
- TRAFFIC LINE MARKING MACHINES**
Littleford Bros., Cincinnati, Ohio
Continental Prod. Co., Euclid, O.
Newaygo Engr. Co., Newaygo, Mich.
- TRAFFIC PAINT**
J. E. Bauer Co., Los Angeles, Cal.
Continental Prod. Co., Euclid, O.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hanline Bros., Baltimore, Md.
Headley Emulsified Prod. Co., Phila.
Hoosier Paint Wks., Ft. Wayne, Ind.
Tropical Paint & Oil Co., Cleveland, O.
- TRAFFIC PLATES**
Alan Wood Steel Co., Philadelphia
American Pressed Steel Co., Philadelphia
Central Iron & Steel Co., Harrisburg, Pa.
- TRAFFIC SIGNALS**
Toledo Pressed Steel Co., Toledo, Ohio
Alumoyd Sign & Signal Co., Chicago
Amer. Gas Accumulator Co., Elizabeth, N. J.
Automatic Signal Corp., New Haven, Conn.
Cretney Traffic Guide Co., Madison, Wis.
Crouse-Hinds Co., Syracuse, N. Y.
Eagle Signal Sales Corp., Moline, Ill.
K. E. Erickson Co., Portland, Ore.
Esco Mfg. Co., Peoria, Ill.
General Elec. Co., Schenectady, N. Y.
Griswold Safety Signal Co., Minneapolis
Horn Signal Mfg. Corporation, Newark, N. J.
Kilbourn & Bishop Co., New Haven, Conn.
Line Material Co., South Milwaukee, Wis.
Little Giant Co., Mankato, Minn.
Lyle-Signs, Minneapolis, Minn.
Natl. Colortype Co., Bellevue, Ky.
Ray-Signs Corp., New Haven, Conn.
Rochester Street Signal Co., Rochester, N. Y.
Standard Traffic Marker Co., Wichita, Kans.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
Traffic Equipment Corp., N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Welsbach Traffic Signal Co., Philadelphia
- TRAFFIC WARNING SIGNS (See Signs)**
- TRAILERS AND SEMI-TRAILERS**
Davenport Loco. & Mfg. Corp., Davenport, Ia.
Electric Wheel Co., Quincy, Ill.
Euclid Crane & Hoist Co., Euclid, Ohio
Highway Trailer Co., Edgerton, Wis.
Chas. Hvass & Co., New York
Rogers Bros. Corporation, Albion, Pa.
Gustav Schaefer Co., Cleveland
Arcadia Trailer Corporation, Newark, N. J.
Detroit Trailer & Mach. Co., Detroit
Eagle Wagon Works, Auburn, N. Y.
Easton Car & Construction Co., Easton, Pa.
Fruehauf Trailer Co., Detroit, Mich.
Imperial Mach. Co., Minneapolis
LaPlant-Choute Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, O.
Muskogee Iron Wks., Muskogee, Okla.
Smith Trailer Corp., Syracuse, N. Y.
Streich Bros., Oshkosh, Wis.
Trailmobile Co., Cincinnati
Troy Trailer & Wagon Co., Troy, O.
Whitehead & Kales Co., Detroit
- TRAILERS, HEAVY MACHINERY**
Highway Trailer Co., Edgerton, Wis.
Chas. Hvass & Co., New York
Rogers Bros. Corporation, Albion, Pa.
- TRAILERS, INDUSTRIAL**
Electric Wheel Co., Quincy, Ill.
Highway Trailer Co., Edgerton, Wis.
Chas. Hvass & Co., New York
Lakewood Eng. Co., Cleveland, O.
Rogers Bros. Corporation, Albion, Pa.
Gustav Schaefer Co., Cleveland
Chase Fdry. & Mfg. Co., Columbus, O.
Clark Tractor Co., Battle Creek, Mich.
Detroit Trailer & Machinery Co., Detroit
Easton Car & Construction Co., Easton, Pa.
LaPlant-Choute Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, O.
Trailmobile Co., Cincinnati
Whitehead & Kales Co., Detroit
- TRAMWAYS, AERIAL WIRE ROPE (See Aerial Wire Rope Tramways)**
- TRANSFORMERS**
Allis-Chalmers Mfg. Co., Milwaukee
American Brown Boveri Corp., Camden, N. J.
Duncan Elec. Mfg. Co., Lafayette, Ind.
Enterprise Elec. Co., Warren, O.
General Elec. Co., Schenectady, N. Y.
Kuhlman Elec. Co., Bay City, Mich.
Maloney Electric Co., St. Louis
Pittsburgh Trans. Co., Pittsburgh, Pa.
Sangamo Elec. Co., Springfield, Ill.
Wagner Elec. Corp., St. Louis
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
- TRANSITS AND LEVELS (See Instruments)**
- TRANSMISSION MACHINERY, POWER**
Allis-Chalmers Mfg. Co., Milwaukee
Chain Belt Co., Milwaukee, Wis.
H. W. Caldwell & Son, Chicago
Dodge Mfg. Corps., Mishawaka, Ind.
Kent Machine Co., Kent, O.
Link-Belt Co., Chicago
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago
- TRASH CANS (See Cans)**
- TREADS, SAFETY**
Blaw-Knox Company, Pittsburgh, Pa.
American Abrasive Metals Co., N. Y.
American Mason Safety Tread Co., Lowell, Mass.
Concrete Steel Co., N. Y.
Norton Co., Worcester, Mass.
Alan Wood Steel Co., Conshohocken, Pa.
- TREADS, TRACTION**
Buckeye Traction Ditcher Co., Findlay, O.
Caterpillar Tractor Co., San Leandro, Cal.
Trackson Co., Milwaukee
Belle City Mfg. Co., Racine, Wis.
Electric Wheel Co., Quincy, Ill.
Rex-Watson Corp., Canastota, N. Y.
- TRENCH EXCAVATORS (See Excavators)**
- TRENCH BRACES (See Braces)**
- TRENCH PUMPS (See Pumps, Contractors')**
- TRUCKS, TANK & SPRINKLER (See Wagons, Tank & Sprinkler)**
- TUNNELING MACHINES**
App Tunneling Mach. Co., New York
- TURBINES**
Allis-Chalmers Mfg. Co., Milwaukee
De Laval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., N. Y.
I. P. Morris & De La Vergne, Inc., Phila.
S. Morgan Smith Co., York, Pa.
Murray Iron Wks. Co., Burlington, Iowa
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.
- TURNABLES FOR MOTOR TRUCKS**
Blaw-Knox Co., Pittsburgh, Pa.
Canton Fdry & Mach. Co., Canton, O.
Champion Engine Co., Kenton, O.
Freeman Mfg. Co., Racine, Wis.
Hug Co., Highland, Ill.
Western Structural Co., Moline, Ill.
- VALVES, CHECK**
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston
Darling Valve & Mfg. Co., Williamsport, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Mich. Valve & Foundry Co., Detroit
Rensselaer Valve Co., Troy, N. Y.

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY

No more hand tamping



TRACKSON
TRACTOR EQUIPMENT



TRACKSON TRENCH ROLLER packs dirt back into the trench as solidly as it was before—in fact *all the dirt* except that displaced by the pipe or cable laid. Thus it saves most of the cost of hauling dirt away and all of the cost of gravel refills and hand tamping. In operation the main unit — a Trackson McCormick-Deering Crawler Tractor — straddles the trench and rolls the 3,500-lb. roller back and forth as the dirt is backfilled or shoveled in. The wide-spaced sure-footed crawlers tread lightly, exerting less than $4\frac{1}{2}$ lbs. pressure per square inch. On average operations the Trackson Roller easily refills 2,600 linear ft. of 4 ft. trench per day. Economies from its use are often almost unbelievable. Every company or municipal department laying cable, conduit or small pipe will be interested in its labor saving possibilities. Full details on request.

Trackson Company
FULL-CRAWLERS & TRACTOR EQUIPMENT

519 Clinton St.

Milwaukee, Wis.

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WHERE TO PURCHASE

VALVES, GATE AND INDICATOR POSTS

Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston
Columbian Iron Works, Chattanooga, Tenn.
Crane Company, Chicago
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve Co., Watford, N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Michigan Valve & Fdry. Co., Detroit
Reading Steel Casting Co., Bridgeport, Conn.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Watrous Co., St. Paul
R. D. Wood & Co., Philadelphia

VALVES FOR GASOLINE ENGINES

Industrial Engine Parts Co., Inc., Cleveland

VALVES, RELIEF

*Neptune Meter Co., New York

VALVES, TAPPING

Eddy Valve Co., Watford, N. Y.
Hays Mfg. Co., Erie, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Co., Troy, N. Y.
Michigan Valve & Foundry Co., Detroit
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Watrous Co., St. Paul

VALVE BOXES AND HOUSINGS

*Central Foundry Co., N. Y.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
H. W. Clark Co., Mattoon, Ill.
Clarksville Fdry. & Mach. Co., Clarksville, Tenn.
J. B. Clow & Sons, Chicago
Columbian Iron Works, Chattanooga, Tenn.
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve Co., Watford, N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Mueller Co., Decatur, Ill.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Watrous Co., St. Paul
R. D. Wood & Co., Philadelphia

VOTING EQUIPMENT FOR CITIES

Automatic Registering Machine Co., Jamestown, N. Y.
Douglas Manufacturing Co., Crete, Nebr.
Ideal Voting Booth Co., Sullivan, Ind.
Korff Manufacturing Co., Lansing, Mich.
Pennsylvania Construction Co., Marietta, Pa.

WAGONS (See Dump Carts and Wagons)

WAGON BODIES (See Dump Bodies)

WAGON LOADERS (See Loaders, Gravel)

WAGONS & TRUCKS, TANK & SPRINKLER

*Joseph Honhorst Co., Cincinnati, O.
*Chas. Hyass & Co., New York
*Littleford Bros., Cincinnati
Acme Road Machinery Co., Frankfort, N. Y.
J. I. Case Treeshing Machine Co., Racine
Gallon Iron Works & Mfg. Co., Gallon, Ohio
Hell Co., Milwaukee, Wis.
Mack Trucks, Inc., New York
White Co., Cleveland

WALL TIES

Berger Mfg. Co., Canton, O.
Concrete Steel Co., N. Y.
Consolidated Exp. Metal Co., Wheeling, W. Va.
M. & M. Wire Clamp Co., Minneapolis
Milwaukee Corr. Co., Milwaukee, Wis.
Reeves Mfg. Co., Dover, Ohio
Wedgit Tie Co., Inc., New York

WASHERS, SAND AND GRAVEL

*Allis-Chalmers Mfg. Co., Milwaukee
*New England Road Machy. Co., So. Boston.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Chicago
Smith Engineering Works, Milwaukee
Stephens-Adamson Mfg. Co., Aurora, Ill.

WATCHES, STOP

Sterling Stop Watch Co., New York

WATER MAIN TAPPING MACHINES

Glauber Brass Mfg. Co., Cleveland
Hays Mfg. Co., Erie, Pa.
Mueller Co., Decatur, Ill.
A. P. Smith Mfg. Co., E. Orange, N. J.

WATER METERS (See Meters, Water)

WATERPROOFING COMPOUNDS AND MATERIALS

*Barrett Company, N. Y.
*Philip Carey Co., Cincinnati, O.
*W. E. Meadows, Inc., Streator, Ill.
*Servicised Premoulded Products, Chicago
*Standard Oil Co. (Indiana), Chicago
Anti-Hydro Waterproofing Co., Newark, N. J.
Atlantic Refining Co., Inc., Philadelphia
Barber Asphalt Co., Philadelphia, Pa.
Euclid Chemical Co., Cleveland
Gensire Steel Co., Youngstown, O.
Headley Emulsified Prod. Co., Phila.
Keystone Roofing Mfg. Co., York, Pa.
Lehon Co., Chicago
Master Builders Co., Cleveland, O.
Minwax Co., N. Y.
Ruberoid Co., N. Y.
Sandusky Cement Co., Cleveland, O.
L. Sonneborn Sons, Inc., N. Y.
Texas Company, N. Y.
Toch Brothers, N. Y.
Truscon Laboratories, Detroit, Mich.
Western Elastite Roofing Co., Denver, Colo.

WATER PURIFICATION (See also Filters)

*Wallace & Tiernan Co., Inc., Newark, N. J.
Paradon Mfg. Co., Arlington, N. J.
R. U. V. Co., N. Y.

WATER PURIFICATION CHEMICALS

Arnold Hoffman & Co., Inc., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Electro Bleaching Gas Co., N. Y.
General Chemical Co., N. Y.
Hooker Electrochemical Co., N. Y.
Mathieson Alkali Works, Inc., N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia

WATER SOFTENERS

American Water Softener Co., Philadelphia
Crane Co., Chicago
Graver Corp., E. Chicago, Ind.
International Filter Co., Chicago
Permutit Co., N. Y.
W. B. Scaife & Sons, Pittsburgh, Pa.
Wayne Co., Ft. Wayne, Ind.

WATER WASTE DETECTION

Empire Electric & Water Co., Inc., N. Y.
Pitometer Co., N. Y.
Simplex Valve & Meter Co., Philadelphia

WATER WHEELS

*Allis-Chalmers Mfg. Co., Milwaukee
Jas. Leffel & Co., Springfield, O.
I. P. Morris and De La Vergne, Inc., Hydr. Div., Philadelphia
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
Pelton Water Wheel Co., San Francisco

WATER WORKS PUMPS (See Pumps)

WEIGHING MACHINES

*Conveying Weigher Co., N. Y.

WELDING APPARATUS

*Alex. Milburn Co., Baltimore, Md.
Burke Electric Co., Erie, Pa.
Clark Tractor Co., Battle Creek, Mich.
Fusion Welding Corp., Chicago
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, O.
Lincoln Electric Co., Cleveland, O.
Macleod Co., Cincinnati, O.
Oxweld Acetylene Co., L. I. City, N. Y.
Smith Welding Equip. Corp., Minneapolis
U. S. Light & Heat Corp., Niagara Falls
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

WELL SCREENS

A. D. Cook, Inc., Lawrenceburg, Ind.
E. E. Johnson, Inc., St. Paul, Minn.

WELL POINTS

*Moore Trench Mach. Co., Rockaway, N. J.
A. D. Cook, Inc., Lawrenceburg, Ind.
E. E. Johnson, Inc., St. Paul, Minn.

WELLS, CONCRETE

Wilson Welder & Metals Co., Inc., Hoboken
Kelly Well Co., Grand Island, Neb.

WELLS, GRAVEL WALL

Layne & Bowler, Inc., Memphis, Tenn.

WELL-DRILLING AND BLAST HOLE MACHINES

*The Burch Corp., Crestline, Ohio
*Loomis Machine Co., Tiffin, Ohio
*Sanderson Cyclone Drill Co., Orrville, O.

Armstrong Mfg. Co., Waterloo, Ia.
Burkhardt Co., Kiel, Wis.
Keystone Driller Co., Beaver Falls, Pa.
Star Drilling Machine Co., Akron, O.

WHEELBARROWS

*General Wheelbarrow Co., Cleveland, O.
*Lansing Co., Lansing, Mich.
Asheboro Wheelbarrow Co., Asheboro, N. C.
American Steel Scraper Co., Sidney, Ohio
Case Crane & Engg. Co., Columbus, Ohio
Chattanooga Wheelbarrow Co., Chattanooga, Tenn.
Cleveland Wheelbarrow Co., Cleveland, O.
Fairbanks Co., N. Y.
Jackson Mfg. Co., Harrisburg, Pa.
Puffer-Hubbard Mfg. Co., Minneapolis
Sidney Steel Scraper Co., Sidney, O.
Sterling Wheelbarrow Co., Milwaukee
Toledo Wheelbarrow Co., Toledo, O.

WHEELS FOR ALL USES

*Electric Wheel Co., Quincy, Ill.

WINCHES

*Beebe Bros., Inc., Seattle, Wash.
*Clyde Iron Works Sales Co., Duluth, Minn.
*Dake Engine Co., Grand Haven, Mich.
*Dobbie Foundry & Mach. Co., Niagara Falls
*J. S. Mundy Hoisting Eng. Co., Newark, N. J.
*Sagan Derrick Co., Chicago
*Gustav Schaefer Co., Cleveland
*Street Bros. Mach. Works, Chattanooga
*W-K-M Co., Houston, Tex.
Advance-Rumely Thresher Co., La Porte, Ind.
Chisholm-Moore Mfg. Co., Cleveland, O.
Clark Tractor Co., Battle Creek, Mich.
Ersted Mfg. Co., Portland, Ore.
Fridy Hoist & Machy. Co., Mountville, Pa.
John T. Horton, Co., New York
Ingersoll-Rand Co., New York
Lidgerwood Mfg. Co., Elizabeth, N. J.
Mead-Morrison Mfg. Co., E. Boston
Muskogee Iron Wks., Muskogee, Okla.
Stephens-Adamson Mfg. Co., Aurora, Ill.

WINDOW FRAMES AND SASH (Metallic)

*Truscon Steel Co., Youngstown, O.
Wm. Bayley Co., Springfield, O.
Detroit Steel Prod. Co., Detroit
E. D. Frederick Co., Holyoke, Mass.
Gensire Steel Co., Youngstown, O.
David Lupton's Sons Co., Philadelphia
Penn Metal Co., Boston
Sykes Metal Products Co., Chicago

WIRE AND CABLE

*American Steel & Wire Co., Chicago
*Williamsport Wire Rope Co., Williamsport, Pa.
American Cable Co., N. Y.
Anaconda Wire & Cable Co., Pawtucket, R. I.
Copperweld Steel Co., Glassport, Pa.
Fischer & Hayes Rope & Steel Co., Chicago
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., N. Y.
Habitshaw Cable & Wire Corp., N. Y.
Hazard Wire Rope Co., Wilkesbarre, Pa.
Kokomo Steel & Wire Co., Kokomo, Ind.
Mac Whyte Co., Kenosha, Wis.
Marion Insulated Wire & Rubber Co., Chicago
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., N. Y.
Okonite Co., Passaic, N. J.
Page Steel & Wire Co., Bridgeport, Conn.
W. S. Robertson St. & Ir. Co., Cincinnati, O.
John A. Roebbling's Sons Co., Trenton, N. J.
Safety Cable Co., N. Y.
Simplex Wire & Cable Co., Boston
Standard Underground Cable Co., Pittsburgh, Pa.
Wickwire-Spencer Steel Co., New York

WIRE MESH REINFORCEMENT

*American Steel & Wire Co., Chicago
*Truscon Steel Co., Youngstown, O.
National Steel Fabric Co., Pittsburgh, Pa.
Wickwire-Spencer Steel Co., N. Y.

WIRE ROPE FITTINGS

*L. P. Green, Chicago
John A. Roebbling Sons Co., Trenton, N. J.

WOOD BLOCKS (See Paving Blocks)

John A. Roebbling's Sons Co., Trenton, N. J.
L. P. Green, Chicago

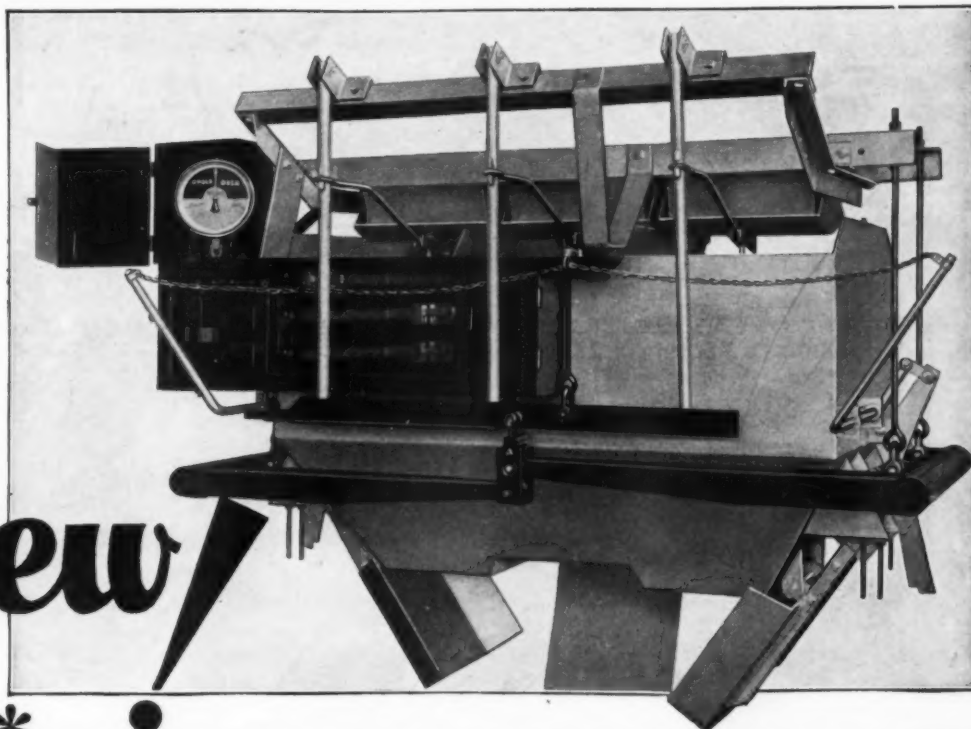
WIRE ROPE (See Rope, Wire)

WOODWORKING MACHINES

*American Saw Mill Machinery Co., Hackensack, N. J.
*C. H. & E. Mfg. Co., Milwaukee, Wis.
*Jones Superior Machine Co., Chicago
Black Bros. Co., Mendota, Ill.
R. L. Carter Co., Phoenix, N. Y.
Jaeger Portable Power Corp., Detroit
Master Woodworker Mfg. Co., Detroit

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover. *

New



* A 3 BEAM, 3 COMPARTMENT BUTLER WEIGHING HOPPER

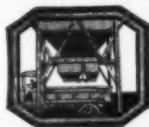
A NEW 3-beam scale that meets the most rigid requirements of the toughest job where speed and easy, dependable operation are important.

This new Weighing Hopper is designed to meet the new specifications of the Joint Committee of the American Association of State Highway officials and the Good Roads Association. This makes it eligible for all state and county work.

It is a marvel of compact, simplified equipment that is easily operated under all conditions. Be sure to get full information on this new Butler product before deciding on new weighing equipment.

BUTLER BIN COMPANY, Waukesha, Wisconsin
Representatives in fifty cities

**This scale can be furnished in the 2-beam type where conditions do not require the use of the 3-beam type.*



BUTLER

Steel **BINS**



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From Baltimore to Shanghai, from Singapore to Boston, from Liverpool to the Battery of New York packet ships and schooners, fast-flying clippers and modern steel, steaming greyhounds have fought for the supremacy of the seas on the simple basis of faster sailing through every brand of wind and weather.

Now a new fleet comes to the land, seeking such supremacy on the same simple basis of faster "sailing" through every kind of going.

It is Barber-Greene's Flying Diamond Fleet of fast-flying ditchers.

From the clay plains of Lone Star Texas, to the rock-studded hard-pan of New York countryside, from the coral rock at Tampa to the hills round San Francisco Bay—the Flying Diamond Fleet shall maintain its name by the same virtue that has made all great fleets great.

That is the virtue of outdistancing all leaden-footed rivals through every kind of soil and "sailing," through deep or shallow ditching, anywhere and everywhere.

BARBER-GREENE COMPANY

485 West Park Avenue
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That the users of Austin-Western Road Machinery may never be inconvenienced, an expert service man with no other responsibility and who is a member of the Austin-Western organization, is now stationed at each of the company's branch offices in principal cities throughout the country. Complete stocks of repair parts

are also available at all branches. Regardless of where Austin-Western machines are in operation, there is now a responsible repair man with necessary parts within reasonable distance.

No longer need contractors or road programs suffer costly and needless delays waiting for some vital part to be repaired or replaced.

This service is just another step in the Austin-Western program for generally improving every road operation and making it cost less—thereby releasing funds for additional operations.

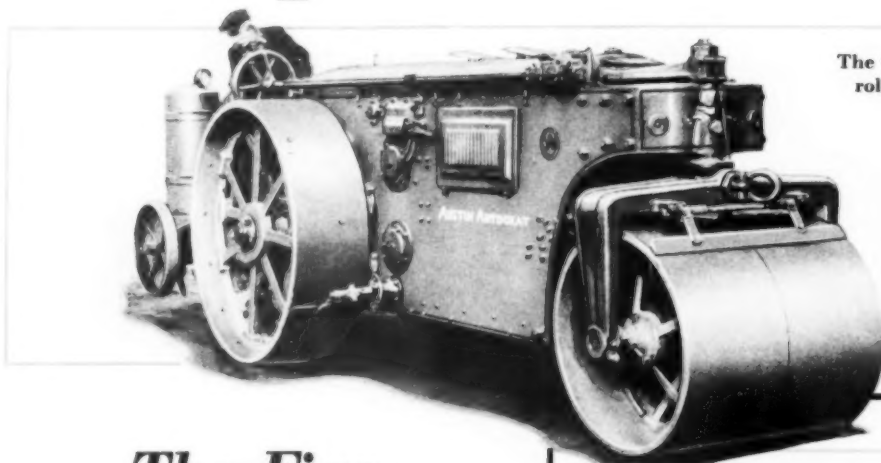
Austin-Western

ROAD MACHINERY

AUSTIN-WESTERN ROAD MACHINERY—COAST TO COAST



"The **BEST** rollers that skill and experience could produce!"



The world's finest roller at work

The Fine Austin Autocrat

NO effort has been spared to make the Autocrat the finest roller in the world. Just to list a few of the outstanding features of this peer amongst road rollers is to suggest a quality and performance never before attained in any roller.

Take for example:

The Duplex Worm Gear Drive in the Autocrat gives the greatest efficiency in the transmission of power ever attained in a roller.

The Heavy Three-Speed Transmission permits the use of massive gears with extra large wearing surfaces that will give years of service.

Two Fourteen-Inch Twin-Disc Clutches, forward and reverse, give positive control and ability to reverse direction without changing gears or releasing a master clutch.

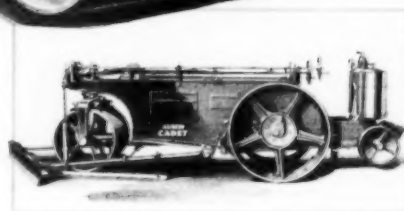
A Streamline Frame of Great Strength and Rigidity gives ample support to the massive parts of transmission and motor assemblies.

An Electric Starting System with generator and storage battery.

A Pneumatic Scarifier with Air Compressor Release to throw the compressor out of operation without trouble or loss of time.

Two Reliable Brakes, a foot service brake and a hand emergency brake.

Stored Electricity for parking or headlights.



AND THE EQUALLY FINE Austin Cadet!

The Cadet is the Autocrat of all pup-sized rollers. Patterned after the famous Austin Autocrat, the Cadet is a completely factory built, 4-cylinder model, making possible three speeds forward and reverse. It is made in 5, 6 and 7-ton sizes, all of which can be fitted with the patented Austin front planing blade and pneumatic scarifier. A short wheel base—only 8' 11 $\frac{3}{4}$ "—provides ease of operation between forms for concrete roads.

THE AUSTIN-WESTERN ROAD MACHINERY CO.

400 North Michigan Avenue • CHICAGO, ILLINOIS • Branches in principal cities

Leaning Wheel Graders, Straight Wheel Graders, Motor Graders, Elevating Graders, Crawler Dump Wagons, Scarifiers, Rock Crushers, Portable Conveyors, Rollers, Motor Sweepers, Street Sweepers, Sprinklers, Road Oilers, Hot Patch Portable Asphalt Plants, Plows and Scrapers.

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ECONOMY FOR INDUSTRY

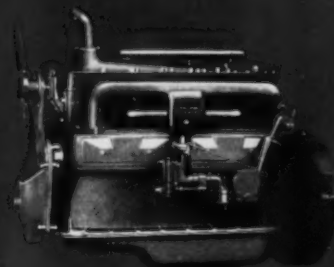
RED SEAL CONTINENTAL INDUSTRIAL ENGINES AND POWER UNITS

Engine Model	No. Cyls.	Bore and Stroke	Horse-power
Y2	2	3 1/2" x 4 1/2"	4-14
H2	4	2 1/2" x 4 1/2"	5-18
H9	4	3 1/2" x 4 1/2"	10-33
W9	4	3 1/2" x 4 1/2"	13-40
M3	4	4 1/2" x 4 1/2"	20-45
S12	4	4 1/2" x 5 1/2"	26-50
14C	6	3 1/2" x 4 1/2"	27-55
29R	6	4 1/2" x 4 1/2"	36-62
30R	6	4 1/2" x 4 1/2"	41-71
31R	6	4 1/2" x 4 1/2"	46-80
32R	6	4 1/2" x 4 1/2"	50-90
28H	6	4 1/2" x 5 1/2"	39-105
H15	4	4 1/2" x 6 1/2"	32-70
H16	4	5 1/2" x 6 1/2"	36-75
H17	4	5 1/2" x 6 1/2"	40-80
H22	4	5 1/2" x 6 1/2"	47-86
H23	4	5 1/2" x 6 1/2"	52-91
H24	4	5 1/2" x 6 1/2"	63-97
H25	4	6 1/2" x 7 1/2"	65-120
H26	4	6 1/2" x 7 1/2"	70-125
H27	4	6 1/2" x 7 1/2"	76-133
H28	4	6 1/2" x 7 1/2"	82-136
21Z	6	4 1/2" x 6 1/2"	91-102
22Z	6	5 1/2" x 6 1/2"	99-109
23Z	6	5 1/2" x 6 1/2"	108-122
P10A	2	3 1/2" x 4 1/2"	4-14
P11	4	2 1/2" x 4 1/2"	5-18
P11A	4	2 1/2" x 4 1/2"	5-18
P20	4	3 1/2" x 4 1/2"	10-33
P20A	4	3 1/2" x 4 1/2"	10-33
P27A	4	3 1/2" x 4 1/2"	13-40
P39A	4	4 1/2" x 5 1/2"	26-50
P45A	6	3 1/2" x 4 1/2"	27-55
P57A	6	4 1/2" x 4 1/2"	36-62
P65A	6	4 1/2" x 4 1/2"	41-71
P73A	6	4 1/2" x 4 1/2"	46-80
P80A	6	4 1/2" x 4 1/2"	50-90
P96	6	4 1/2" x 5 1/2"	39-105
P55	4	4 1/2" x 6 1/2"	32-73
P61	4	5 1/2" x 6 1/2"	36-75
P67	4	5 1/2" x 6 1/2"	40-89
P74	4	5 1/2" x 6 1/2"	47-85
P79	4	5 1/2" x 6 1/2"	52-91
P88	4	5 1/2" x 6 1/2"	60-97
P110	4	6 1/2" x 7 1/2"	65-120
P120	4	6 1/2" x 7 1/2"	70-125
P130	4	6 1/2" x 7 1/2"	76-130
P139	4	6 1/2" x 7 1/2"	82-136

Model 14C—6-cylinder Red Seal Industrial Engine with foot-type housing and radiator



Model 14C—6-cylinder Red Seal Industrial Engine with Automotive type housing



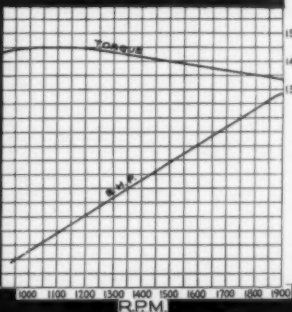
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CONTINENTAL MOTORS CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
Office and Factory: Muskegon, Michigan
The Largest Exclusive Gasoline Motor Manufacturer
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Model P45A—Red Seal Industrial Power Unit with 14C industrial engine



Continental Engines

Two



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CLETRAC 100	7500

All Prices F. O. B. Factory

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-and no time
lost for
repairs



TWELVE months ago Platte County, Mo., added a Cletrac to the county's equipment. It was a Cletrac "40"—famous for power and dependability. One of its first jobs was grading and dragging 120 miles of roadway. Within one year's time this rugged Cletrac rolled up a total of 2000 working hours—and no time lost for repairs!

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THE CLEVELAND TRACTOR CO.
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ALL-STEEL



AIR PRESSURE SCARIFIER



CAST STEEL WHEELS

CAST STEEL
DIFFERENTIAL

THE FEATURES



THE ALL-STEEL, ALL-PURPOSE,

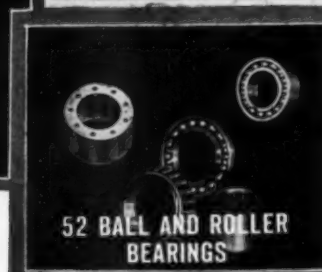
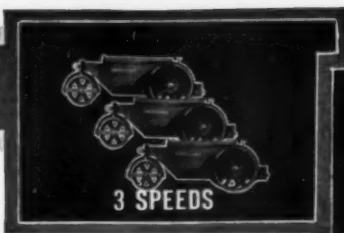
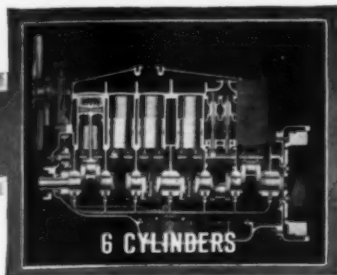
Outstanding performance! **HERCULES** the Roller is emancipating the contractor from the roller worries of the past. This remarkable tool—the result of many years of experience in building road-making machinery—is establishing records for fast and efficient work, low operating and maintenance costs, flexibility, mobility, power and ease of handling. All-steel construction, three speeds in each direction, six cylinder seven bearing crankshaft motor with 35% reserve

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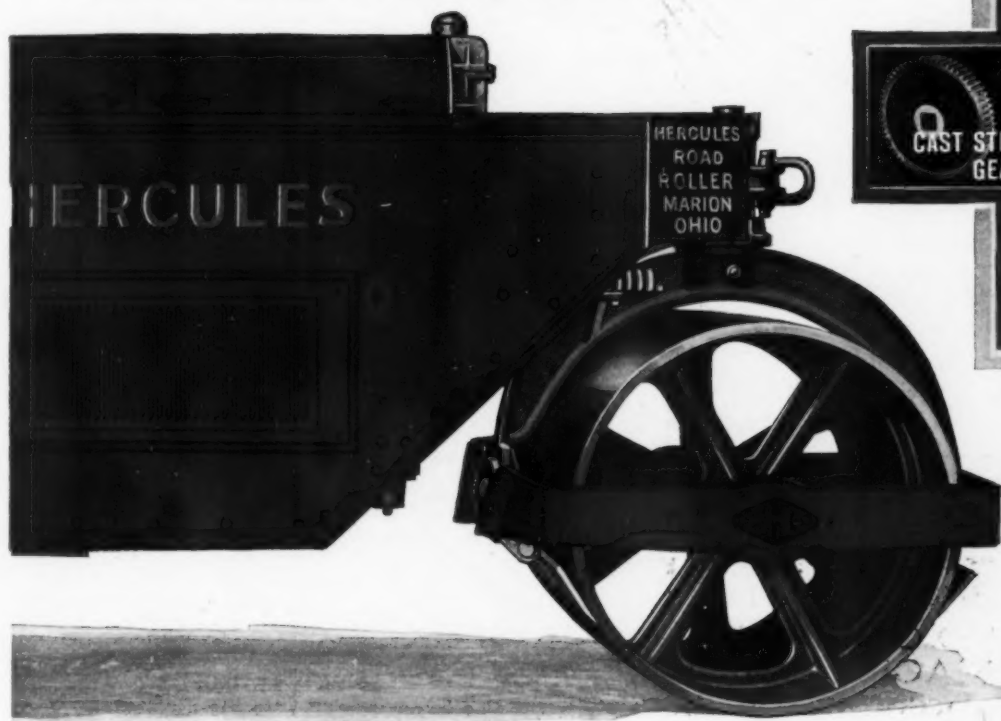
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7700 lb. DRAWBAR TEST



OF HERCULES



LONG-SERVICE ROAD ROLLER

power, ball and roller bearings throughout—fifty-two of them, all gears and clutches enclosed and running in a bath of oil, one lever for forward and reverse motions, seventeen hundred pound drawbar pull—the most powerful roller built. There isn't a rolling job it won't handle better, cheaper and faster. Introduced this year and already specified by six State Highway Departments. Its on the biggest contracts this year. Sold by the leading Contractors' Equipment Dealers.

COMPANY

Osgood Company
OHIO



Convertible

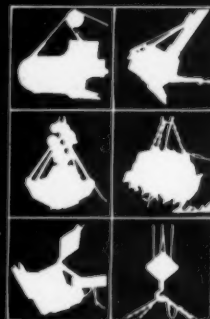


A 1 $\frac{1}{4}$ yard OSGOOD Victor Clamshell owned by Louis Petrillo, Inc., general contractor at Mount Vernon, N. Y., handling sand and gravel from barges to hoppers. Mr. Petrillo says, "I am very much pleased with the work done by this crane. I have had several other cranes, but none has given me the satisfactory service the OSGOOD has. My repair bills have been considerably less and the gasoline consumption reduced."

CHANGED in the FIELD TO ANY SERVICE

NO CHANGES IN OPERATING
MACHINERY NECESSARY

OSGOODS are convertible right on the job for many different services—shovel, dragline, clamshell, crane, or backhoe. It isn't necessary to change the operating machinery—just change booms, Reeve the cables, start the engine and go to work. Powered with a husky six cylinder engine or single electric motor, the simply designed and sturdily built operating machinery handles all services with a new high efficiency. Even in the toughest going that would quickly 'break' an ordinary machine, an OSGOOD is on the job year in and year out giving trouble free service and piling up profits. Write for OSGOOD facts.



Six services are regularly used on OSGOOD machines—shovel, dragline, clamshell, crane, backhoe and magnet. The OSGOOD shovel boom and handle are the armored type giving maximum strength and resiliency. The crane boom is the bow type ruggedly built in two sections, and equipped with a built-in tagline. A universal fairlead is furnished for dragline service.

THE OSGOOD CO.
MARTIN OSGOOD



PARSONS DITCHER

Suit Bucket and Traction Speed to the Digging!

HIGH bucket speed with fast traction and conveyor speed when the digging is easy—slower bucket or slower traction, or both, when it's tough going! Two bucket speeds, four traction and two conveyor speeds make the Parsons adaptable to any sort of digging and allow full-capacity operation. Because it's so thoroughly anti-friction in design, equipped with roller bearings, and with gears in enclosed oil bath, the Parsons delivers utmost power to the buckets where it counts most for profits! It's the *Heavy Duty Ditcher* with the patented offset boom that digs on either side within inches of curbing, etc. and spills its load to either side. 5 sizes — the right one for your job.

Write for Parsons Ditcher Catalog today.

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Pavers, Mixers; Power Shovels,
Pull Shovels, Cranes, Draglines;
Dumpers.

INSLEY
Excavators; Concrete Placing
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T. L. SMITH
Tilting and Non-tilting Mixers,
Pavers, Weigh-Mix.

PARSONS
Trench Excavators, Backfillers.

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Portable Saw Rigs, Pumps,
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KWIK-MIX
Mixers: Concrete, Plaster
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30th St. & Concordia Ave.
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These are great names known
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KOEHRING

Struck Measure!

THAT'S what you get when you buy a Koehring — **STRUCK** measure, **NOT** heap measure!

What the Koehring does hold in a heap *above* the level of the dipper edges is yours as an *extra!*

In other words, you can yardstick a Koehring dipper and find that it holds the rated capacity when the load is struck off level with the dipper edges!

No allowance asked for the heap above the level of the dipper edge!

Koehring Heavy Duty construction and FingerTip control are equal certainties of extra value. *Know the Koehring.*

N. E. C. PRODUCTS

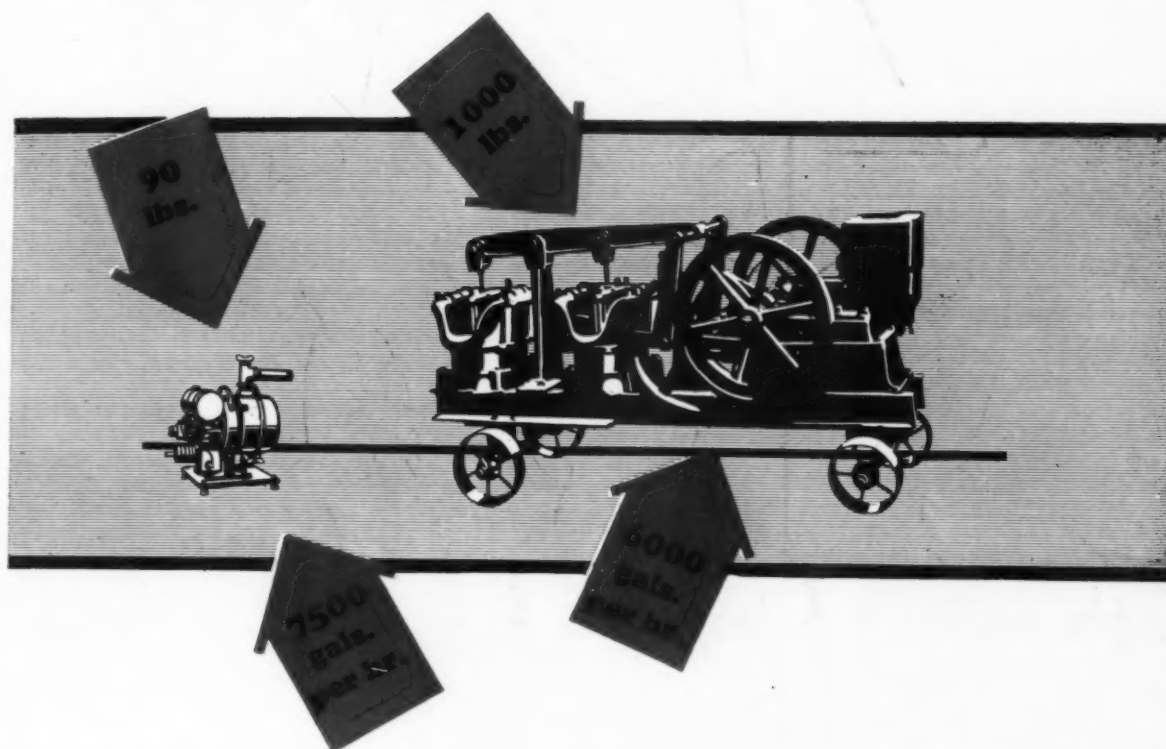
KOEHRING — Pavers, Mixers; Power Shovels, Full Shovels, Cranes, Draglines; Dumpers. INSLEY — Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks. T. L. SMITH — Tilting and Non-tilting Mixers, Pavers, Weigh-Mix. PARSONS — Trench Excavators, Backfillers. C. H. & E. — Portable Saw Rigs, Pumps, Hoists, Material Elevators. KWIK-MIX — Mixers: Concrete, Plaster and Mortar.



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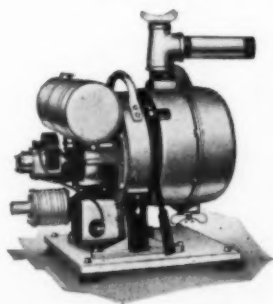
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what do you mean Capacity?

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f. o. b. factory



And self priming— The Homelite Portable Centrifugal Pump will stand rough construction service in spite of its light weight. Dependability . . . thousands of these 1½ H.P. air cooled Homelite engines on pumps and generators are working all over the world—some for more than eight years. Suction lift . . . up to 20 ft. Head . . . up to 50 ft. Economy . . . 4 to 5 hours per gal. of gasoline. Mud and grit . . . O. K. to 35% of solids, heavy oils, gasoline—anything that passes the Homelite strainer.

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Self Priming Portable Centrifugal Pump

Also Portable Blowers, Air Compressors, Generators,
driven by Homelite Engines

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Homelite Facts that get home

Self Priming—no foot valve. No vacuum auxiliaries of any kind. Capacity 25000 gal. per hr. Suction lift 20 feet. Powered by LeRoi 8-10 H.P., 4 cylinder gasoline engine. Bronze open type impeller. Handle telescopes into frame when not in use. Weighs 730 lbs.

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F. O. B. Port Chester, N. Y.

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Portable Centrifugal Pump

Here's the big brother to the 2-in. Self Priming Pump that still holds the lightweight pumping championship of the world.

Look at this big boy—ready to do your heavy pumping.

Distributors near you will gladly demonstrate on your job. We'll wire you the name of the nearest if you'll ask.

HOMELITE CORPORATION
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HOMELITE

Portable Self-Priming Centrifugal Pump

Also Portable Blowers, Air Compressors, Electric Generators—all driven by Homelite Air Cooled Engines

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MARSHALL FOCH



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The GENERAL Crane does many operations swiftly, efficiently and economically. Crane boom assembly handles dragline, clamshell, backfiller, hook block, or magnet without changes in operating machinery. This wide variety of services is convenient when there are different types of work to be done in a hurry. SIX CYLINDER gasoline engine or single electric motor. The GENERAL may be furnished with electric lights, starter, and oil filter for motor. Give the GENERAL an opportunity to show you some action.

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Illustrated in the pages of this book are interesting photographs of the M-W "AIR KING" in action—important features and engineering details that make these machines the world's premier Portable Air Compressors. Facts and figures that mean valuable savings in your operating expense—facts that show how each AIR KING saves the labor costs of from 5 to 50 men!

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THE NEW WOOD IMPROVED SLANT TYPE HYDRAULIC HOIST

New power to lift heavy loads—new speed for fast dumping—new rugged unit construction; these features of the new slant type hoist built by Wood are



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***SPEED* in Power Loaders**



THE New England crawler type loader embodies several exclusive features which make for speedy and economical operation.

Expressly designed for the handling of sand, gravel and crushed stone and for digging in sand and gravel banks. They load at the rate of 2 yards per minute and have a working speed of 13' per minute when crowding into a gravel bank.

Buckets are 20 inches wide, and when level full load at the rate of 2 yards per minute. Machine has a forward speed up to 77 feet per minute, which cuts to a minimum the time in moving from job to job.

Other features are: adjustable elevator, independent action of elevator and crawler, one-man operation, positive self-feeding action, enclosed gears, automatic clutch release and adjustable loading chute.

NEW ENGLAND ROAD MACHINERY CO.

Manufacturers of Power Loaders, Crushers, Screens, Washers, Elevators, Feeders, Conveyers, etc.

Write for catalog of the equipment of particular interest to you.

163 C STREET SOUTH BOSTON, MASS

IN THE PUBLIC EYE



THERE is probably no danger signal on the road that causes such prompt and willing obedience to its warning as a Dietz "Red" Lantern.

For this most important reason, plus reasons of unequalled economy, Dietz Red Lanterns are the best night warning lights that contractors doing highway work can use for protection of the public and their own interest.

In places where an extra bright light and a long time between fillings is desired we recommend Dietz Cold Blast "Little Giant" Lantern—illustrated. It is 11½ inches high—burns 70 hours.

**R. E. DIETZ COMPANY
NEW YORK**

*Largest Makers of Lanterns
in the World*

FOUNDED 1840





Socony Cold Patch constructed by State Forces at Glenmont Bridge, Albany County, N. Y.

STANDARD ASPHALT PRODUCTS

(Socony Brand)

Standard Asphalt Binder A
for surface treatment

Standard Asphalt Binder B
for penetration work

Standard Asphalt Binder C
for the mixing method

Standard Asphalt Joint Fillers
for brick or block pavements

Standard Cold Patch Asphalt
*for repairing all types of
bituminous road surfaces*

Standard Refined Asphalt
for sheet asphalt paving

Standard Paving Flux
Bridge Asphalt and
Preserving Oils

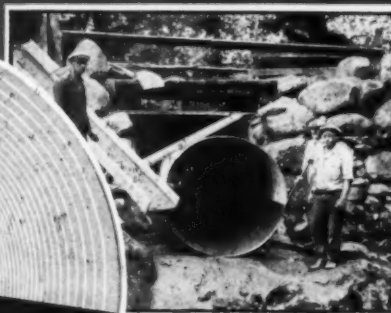
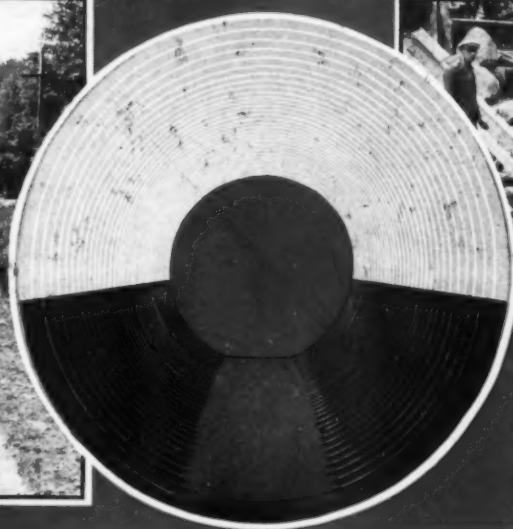


*Specifications and all other particulars
furnished on request*

STANDARD OIL COMPANY OF NEW YORK

Now Even greater durability

is built into a drainage product



Wherever silt, sand, stones and boulders of hydraulic traffic go rumbling, tumbling through drainage pipes, Armco Paved Invert Pipe can be used effectively to combat their destructive action.

ARMCO *Paved Invert Pipe*

ARMCO, developer of the drainage pipe that holds the world record among corrugated metal products for endurance in service, now presents another—and greater—advance.

The Armco Paved Invert Pipe—first and only successful resistant of erosion!

Although new in nation-wide distribution, Paved Invert Pipe (paved where the wear comes—where a shoe is soled and a tire is treaded) is already four years old. And it was proved right long before a length of it was offered for sale—by exhaustive, tireless research, laboratory tests and field studies.

Now, four years on the market and doing duty in many States and Canada, Armco Paved Invert Pipe has been proved by Nature as a successful combatant of the forces of erosion. Four years in the ground, Paved

Invert Pipe is announced as the only product able to "stand up and take" the constant, month in, month out, year in, year out assaults of sand, silt, stones and boulders that accompany hydraulic traffic.

Paved Invert Pipe is basically Armco Corrugated Iron Pipe, the Nature-tested and proved product whose 24-year record in use is unequalled. Its paving is elastic—expands and contracts with the pipe. Air and moisture cannot penetrate it, and it remains plastic within the widest range of temperatures. It stays tough and resilient and adheres firmly to the base metal.

It is destined for a long life and is ideally suited to almost all drainage requirements. Data, explanatory and pictorial, will be sent on request. Mail the coupon.



ARMCO CULVERT MANUFACTURERS ASSOCIATION
Middletown, Ohio

Send descriptive pictorial data on Armco Paved Invert Pipe.

I am ☐ an Official ☐ Engineer ☐ Contractor

Name _____

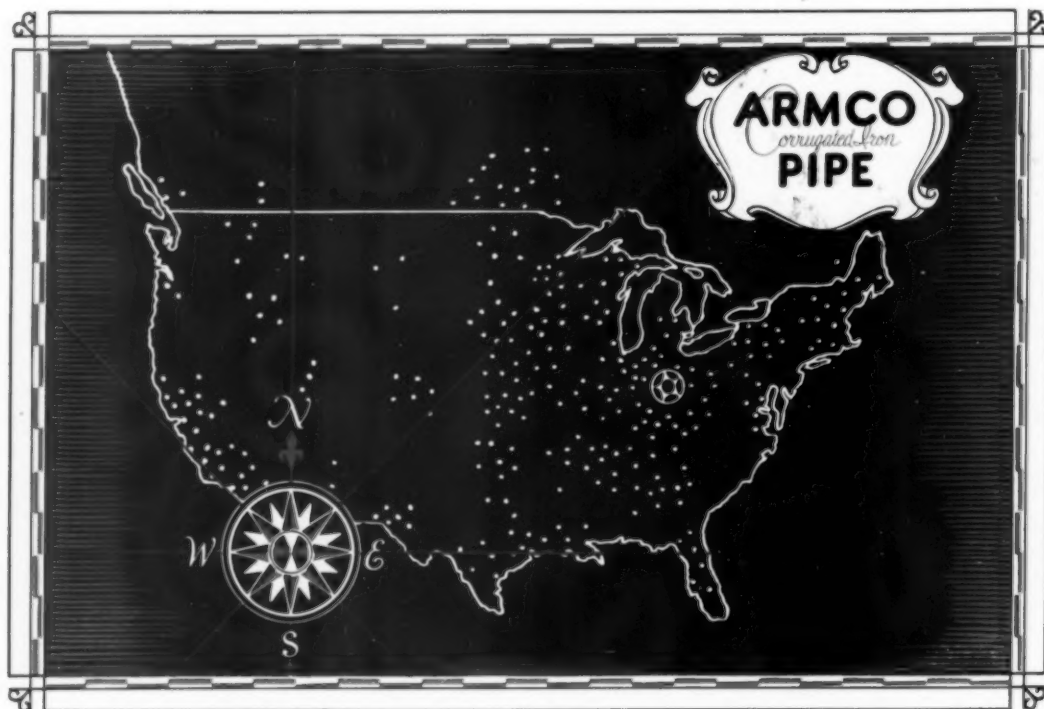
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CEM 6

A NATIONWIDE SERVICE *for buyers of Drainage Products*



*Each dot an Armco engineer. . . a nation-wide staff of drainage specialists
. . . gathering the facts that help you select the best drainage product.*

PERHAPS you buy a certain type drain pipe because you know it will last. You may be partial to the kind that is easily hauled to the job, and installed with a low labor cost. Or the product that withstands the pressure of a deep fill and the weight of traffic—one that will not crack, or break or disjoint . . . the kind that can be successfully laid in an uneven trench or on filled ground. One that can be easily extended when the road is widened, or handily moved.

Now you can easily decide which product will prove most satisfactory.

Through their actual field investigations and studies, the nation-wide organization of Armco engineers has assembled for you at Drainage Headquarters, Middletown, many volumes of facts. The story is complete. It includes information that saves hundreds of thousands of dollars for drainage product users every year.

Headquarters facts tell you that Armco Corrugated Iron Pipe (made uniformly of pure iron continuously since 1906) holds the record for long life in service—24 years to date.

Armco Corrugated Iron Pipe hauls easier and is quickly placed in service

with a minimum of cost. It requires less trench preparation and may even be laid on settling or filled ground.

Comparisons with other pipe are clearly made in Headquarters facts. The modern importance of installing a product which may be added to at the time of widening the road, is amply demonstrated. The need for strength to resist today's increasing traffic loads is pointed.

Armco engineers specializing in drainage are in your vicinity, ready to present the facts and aid you in any drainage problem. Mail the coupon—over—for complete data.



Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand



ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio



Contractors:

Cut costs this way..

Here's a sound plan that has proved practical for thousands of contractors and other successful business men: To cut your hauling costs, put a Dodge Truck to work.

Dodge Trucks are confirmed money-savers for these reasons: They have the power you need for hill, hole or soft ground. Provide the speed that enables you to make more trips and save more time. Insure the dependability you want for year-after-year adherence to schedules. Attract patronage by their fine appearance. Please drivers by their roadability, comfort and handling ease. Are so designed and built that economy and long life are definitely assured.

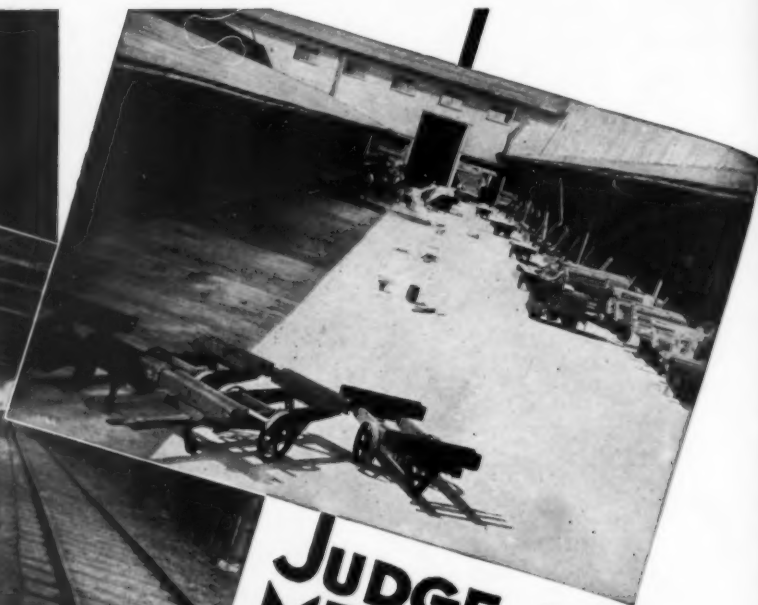
See your Dodge Brothers dealer. Inspect Dodge Trucks. Compare them. Drive one. Choose from 124 standard types, ranging in capacity from 1/2-ton to 3-tons. Buy one complete with body. Rest assured that it will cut your costs — increase your profits.

DODGE TRUCKS

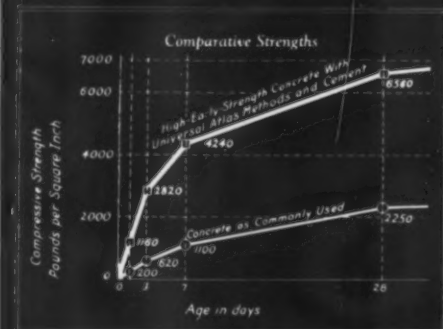
Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



Driveway Pavements and Loading Docks
Weyerhaeuser Timber Co.
St. Paul, Minn.



**JUDGE THE
METHODS BY
THE RESULTS
OBTAINED WITH
THEM...**



Loading Dock of High-Early-Strength Concrete Ready for Steel-Tired Trucks in 3 days

The Problem The Weyerhaeuser Timber Co., St. Paul, did not want to wait weeks for their new concrete loading docks and driveway pavements. In addition to speed, they wanted a particularly strong, durable pavement to stand up under the traffic of heavy, steel-tired trucks.

The Solution High-early-strength concrete, made with Universal Atlas methods and cement (the same portland cement as furnished for regular concrete work), speeded up construction so that the pavements were ready for use in 3 days.

There are hundreds of jobs on which a speedier, stronger, more durable concrete is needed. To help you get a bigger share of such business, send the coupon below for booklet showing how to obtain high-early-strength concrete with Universal Atlas methods and cement.

16

Name _____

Address _____

Universal Atlas Cement Co.
208 South La Salle Street, Chicago

Without obligation, please send me booklet on Universal Atlas methods for securing high-early-strength water-tight concrete. G.A.E.M. 9-30

Universal Atlas Cement Co.

Subsidiary of United States Steel Corporation
Concrete for Permanence

OFFICES IN Chicago, New York, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Columbus, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Omaha, Oklahoma City, Birmingham and Waco

Short but Important Link

Rebuilt As 40-Foot Concrete Road

George M. Brewster & Son,

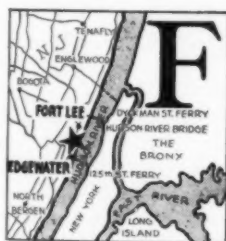
Bogota, N. J.,

Used a Complete Organization

on 0.892-Mile Job



Type of Subgrade on the Job Showing Trench Cut for Service Connection, Exposing the 30-Inch High Pressure Water Main



FEDERAL HIGHWAY No. 9 is one of the important arteries of traffic on the west side of the Hudson River. Both New Jersey and New York have, within the last few years, rebuilt long sections of this thoroughfare to care for the rapidly increasing traffic. A short section be-

tween Fort Lee and Edgewater, N. J., has been a bottleneck to traffic in New Jersey. This section is less than 2 miles from the Hudson River Bridge now under con-

struction and is located between two important ferry crossings to Dyckman Street and 125th Street, New York. The 0.892-mile section was graded last fall and concrete work pushed to completion early this summer. Traffic was maintained by a complete detour.

PREPARATION OF SUBGRADE

Inasmuch as practically all of the new road is over old right of way, the rough grading was not a particularly large item, although there was considerable rock work and it was necessary to rip up the old, well-compacted asphalt macadam roadway which has been down for many years. An Erie steam shovel handled this part of the work quickly, following which the grade was completed with hand labor and rolled with a 10-ton Buffalo-Springfield gas roller.

The foundation course was almost entirely ledge which was covered with a 6-inch mat of stone dust and screenings from the large commercial plant operated at the new Hudson River Bridge at Fort Lee as a means of converting a large piece of rock excavation into a profitable enterprise.

The contract for this work was awarded to George M. Brewster & Son, Bogota, N. J., on October 2, 1929, and grading operations started the following day. The contract for grading and concreting called for a time limit of 50 working days.



Although Most of the Subgrade Was Ledge, There Were Soft Spots Along the Shoulders. These Will Be Overcome by the Improved Asphalt Penetration Shoulders to Be Built

**PREPARING THE GRADE**

1. Trenching in foreground for service connections and Pup roller compacting 6-inch blanket of screenings over the ledge

CHECKING SUBGRADE

2. A Standard New Jersey scratch board used to check the subgrade which the form-setters found almost perfect



The grading operations involved considerable change of grade in that the old asphalt road had been continuously built up through the addition of asphalt and aggregate during maintenance. The contract called for 3,163 yards of rock excavation, 5,500 yards of earth excavation and 3,260 yards of borrow which was hauled an average of 2 miles from Leonia and from the Hudson River Bridge site. Most of the excavation went into a fill at the south end of the job where a spur was constructed to permit traffic to turn west without rounding the sharp corner which had previously existed at that point.

The plant and equipment of Frank Batthglia & Sons, Fairview, N. J., were taken over and operated by the Brewster organization for the rock excavation and rough grading. They used two Ingersoll-Rand portable compressors and one Speeder crane, one Universal crane mounted on a Mack truck and one Orton crane with a clamshell. Much 60 per cent du Pont gelatine dynamite was used well covered with logs to prevent scattering of the rock.

**BLASTING DIFFICULTIES BECAUSE OF PRESSURE
WATER MAIN**

Considerable difficulty was experienced in blasting because of a 30-inch cast iron water main carrying water at high pressure throughout the length of the job. Because of the change in grade, it was necessary

to lower this main 2 feet for about 200 feet of its length, maintaining the pressure in the main at all times. The previous grade of the main bowed up slightly at the center and the new grade in the 200-foot section required that the main bow down. As the new trench was excavated, the pipe was shored up and put on jacks. Then, when it came time to lower it, the jacks along the middle were let down three turns before the ends were dropped at all. During blasting there were three breaks in this high pressure main, which sent spectacular geysers into the air, but prompt attention to them prevented loss of service to the communities supplied. The breaks were repaired with bolted sleeves.

FINE GRADE AND FORM SETTING

Under the direction of Daniel Melchiorre, general foreman, the Brewster organization rapidly set up the Blaw-Knox 9-inch forms in well-prepared trenches ahead of paving. Two men were assigned to hand grading ahead of the form setting, this number being sufficient because of the almost perfect subgrade it is possible to set up and maintain when there is a ledge foundation and 6 inches of first class rock screenings well rolled on top. Four men easily set the forms which held their line and grade admirably in spite of only 6 inches of subgrade in most places into which to drive the stakes.

PROPORTIONING AND HAULING BATCHES

Stone, sand and cement were loaded at the quarry of the Belmont-Gurnee Stone Co., and hauled about 6 miles to the job. The Belmont-Gurnee Stone Co., at North Bergen, N. J., is one of the largest commercial operators for stone in the northern section of New Jersey and is owned by George M. Brewster & Son. The large quarry adjacent to the track of the Northern Railroad of New Jersey and the West Shore Railroad, has been thoroughly inspected by engineers of the New Jersey State Highway Department and certain sections of the quarry designated for the production of aggregate for State Highway work. Stone from these sections has been stock-piled in 6-inch layers to take care of the work for the current season.

A 200-ton Blaw-Knox three-compartment bin with three beam scales had been set up below a section of ledge so that trucks could deliver the 1½-inch and ¾-inch stone and the sand direct to the bins at the top, while the batch trucks could back in underneath and receive the accurately proportioned batches. The average batches based on 45 per cent voids were 1,225 pounds of 1½-inch stone, 1,225 pounds of ¾-inch stone and 1,155 pounds of sand. This batch required 7 bags of cement and 28 gallons of water at the paver.

A novel method of handling the cement was used by the contractor on this job. It is customary on most paving jobs to carry the bags of cement on top of the batched sand and stone or to line them up along the

forms. On this job the cement in paper bags was loaded into the trucks first at a platform alongside and just below the freight cars in which the cement was received. Then, the truck backed under the batcher and received first its sand and then stone, completely covering the bags. Then, when they were dumped into the skip, the bags came out on top and were quickly broken up with picks, emptied and the bags burned alongside the forms. This procedure seemed very effective, but would not be possible with cloth bags because the bags might take up sufficient moisture from the sand during the 8-mile haul to cause "balling" of the cement in the mixer. Six 4-batch Mack trucks were used to supply the Koehring 27-E paver.

THE CONCRETING CREW

Following up the form setting gang and ahead of the paver, were two men who set the bulkheads and pins, three men who set the steel and also spaded the concrete at the forms to prevent honey-combing. The paver ran outside the forms between which concrete was being poured. Elastite expansion joints were set at 34-foot intervals and also between the four adjacent slabs.

The expansion joints were set with an equal leg cap about 2 inches deep and supported by 4 or 5 stakes on the far side from the paver and 2 or 3 as needed on the near side. Three 2-foot x ¾-inch dowels were run through the expansion joint to tie the slabs together.



LOADING CEMENT AND BATCHES AT BELMONT-GURNEE STONE COMPANY QUARRY, NORTH BERGEN, N. J.

1. Chuting cement in paper bags from freight car to batch truck before loading aggregates. This was later replaced by a galvanized iron shed for storage and through which the cement bags could be delivered direct from car to truck by roller conveyors. 2. The Blaw-Knox 200-ton batcher plant showing ramp at top for loading the bin and truck below receiving batches

The state specifications require that one end of each dowel be wrapped and supported. The contractor elected to use paper tubes for wrapping, placing them on the side toward the paver and supporting them with chairs of bent reinforcing steel.

An efficient operator handled the Koehring paver, the mixing period of which was set for and locked at $1\frac{3}{4}$ minutes.

Three men handled the puddling, following which the three men who set steel struck off the bottom course, 2 inches below the top of the form and then placed the welded fabric reinforcement. The welded fabric reinforcing is known as Grade E and was in 9 x 12 mats weighing 76 pounds per mat.

Following this, the Ord finisher made two passes over the top of the 9-inch slab with two men shovelling to the strike-off and one man spending all of his time operating the finisher. The Ord finisher was operated with flanged wheels on the forms for the first strip of concrete which was laid on the east side, starting at the north end and run for about 2,000 feet. On the second strip, double flange wheels were used on the finisher to run on the road form and on the completed strip, steel angles were laid on the finished pavement and the finisher wheels ran on these angles to protect the edge of the concrete.

The hand finishers used a supple white pine, double belt following the machine belting on the Ord finisher. If any surplus water was in evidence, it was dragged off with a strip of burlap. Two plank bridges were pro-

vided for the hand finishers to save time in walking from one side of the slab to the other for the hand edging and finishing of the expansion joints.

Following checking of the surface for irregularities with a 10-foot Lakewood straight-edge, the hand finishers wire broomed the surface to give it a non-skid finish and then one man with a small gas engine operated compressor and tank on two wheels applied Curcrete, an asphalt emulsion, for curing. This method of curing which is permissible under New Jersey State Highway specifications, does away with the need of any admixture or application of hay and sprinkling.

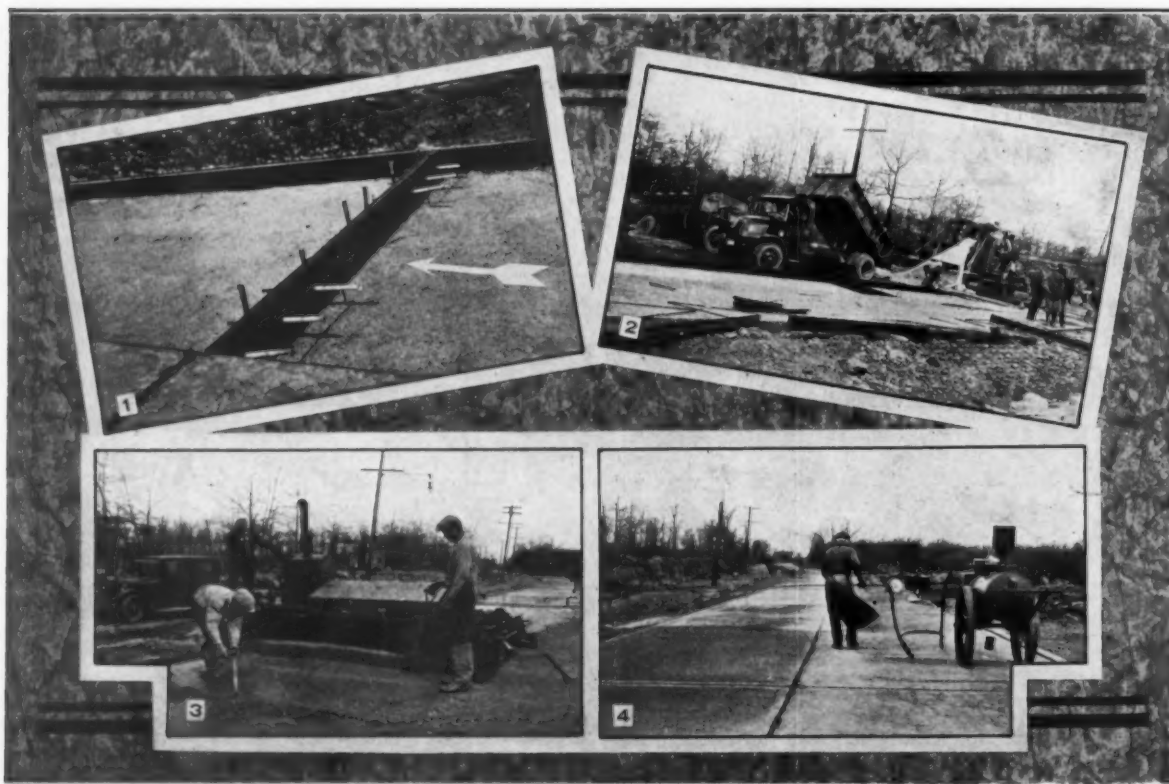
REINFORCING OVER TRENCHES AND SOFT SPOTS

Over all trenches and soft spots double reinforcing is required. The welded fabric mats were placed not only 2 inches from the top, but also 2 inches from the bottom and, in addition, $\frac{3}{8}$ -inch bars, 6 inches center to center, were placed across the trenches and two bars laid longitudinally with the line of the trench.

INSPECTION

The State Highway Department has a very effective inspection organization. Two inspectors are assigned to the batcher, one on weight and the other on tests of the aggregate, with one inspector on finishing, one on subgrade and forms, one on checking the mixer and an engineering party of four men on line, grades and checking quantities. These inspectors work under the direction of the Resident Engineer.

(Continued on page 64)



CONCRETING OPERATIONS

1. Expansion joint showing cap and dowels. Paver is approaching (outside) the forms as indicated by arrow.
2. Delivering the batch to the Koehring 27-E paver. The first strip is seen in the foreground and the second strip is being poured with the paver and trucks running in the third strip.
3. Filling the low spots shown up by the first passage of the Ord finisher.
4. Applying the Curcrete after hand-finishing, straight-edging and brooming.

Drilling Without Drills

The Churn-Pipe Boring Method

Is Used at the

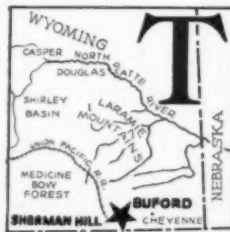
"Top of the World"

to Obtain Ballast for

the Union Pacific Railroad

By

E. H. Simpson



TRANSCONTINENTAL travelers, especially if their homes are near sea level, usually show much interest when passing the highest point en route—the "top of the world." In traveling on the Union Pacific Railroad, this point is reached about 30 miles west of Cheyenne, Wyoming, and

is known as Sherman Hill. However, the word "hill" is hardly fitting to this locality, for it is more than 8,000 feet above sea level and constitutes the backbone of the Laramie range of the Rocky Mountains. A sort of saddle occurs here, which makes for an easy passage over the range.

Sherman Hill has an important and economic significance to the Union Pacific Railroad. It is here that ballast is obtained for the entire system. The granite in large areas on this hill is disintegrated to a depth of 20 to 30 feet, and when blasted with explosives, breaks into pieces varying from $\frac{3}{4}$ -inch to $1\frac{1}{2}$ inches in size. It is beautiful in appearance and has all the tints of the rainbow, with red and gold predominating. This granite works and dresses into the track easily and has an even consistency and resiliency, making an ideal material for track ballast.

THE BUFORD QUARRY

The present quarry is located at Buford, 5 miles east of the hill, and extends $1\frac{1}{4}$ miles along both sides of the main line. The face runs from 20 to 30 feet high. Due to the severe winters prevailing at this



Large Quantities of Explosives Are Used at the Top of the World for Blasting Disintegrated Granite

altitude, the pit is worked only during the summer months. All operations cease about the first of September and are not resumed until May.

ALTITUDE DEFEATS AIR DRILLS

The method of drilling holes in this material is novel. Formerly, pneumatic drills were used, but on account of the extent of the pit and the altitude, the maintenance of the necessary air pressure was found to be uneconomical and unsatisfactory. When steam was tried in the drills, it was found that the steam alone accomplished the desired results. So the drills were discarded in favor of a churn pipe attached to a rubber hose, which in turn is connected to a locomotive boiler. The locomotive is moved along on a track as the drilling progresses. The steam, under high pressure, softens the material as the churn pipe works its way downward and blows the loose pieces of gravel out into the air as it proceeds. This method is just as efficient at a 25-foot depth as it is at 1 foot.

BLASTING

Holes are spaced 25 feet back from the face and 20 to 25 feet apart, and average 3 inches in diameter and 25 feet in depth. They are chambered with 20 to 40 pounds of du Pont 40 per cent Red Cross Extra dynamite and are then loaded with black blasting powder. The shots are set off with electric blasting caps. The quantities of powder used vary with conditions, but average $\frac{1}{5}$ to $\frac{1}{4}$ -pound per cubic yard of material to be moved. These charges serve to break down the mass into sizes small enough so that the granite can be easily loaded with a 5-yard steam shovel.

LOADING

Following the blasting operation, the material is loaded into specially constructed gravel cars which have a capacity of 40 cubic yards, or about 110,000 pounds. After loading, these gondolas are moved to switch tracks where main line trains can conveniently pick them up for the trip down the mountain. Shipments are made east or west to the points where the ballast



By Using Steam Supplied from the Boiler of the Locomotive the Churn Pipes Are Able to Bore Holes to a Depth of 25 Feet

is to be used. Under average working conditions, from 200 to 250 cars of ballast are taken out each day. Requirements for 1929 were over 1,000,000 cubic yards.

This gravel ballast is used on the lines of the entire Union Pacific System in Utah, Wyoming, Colorado, Nebraska and Kansas; and to date more than 8,000,000 cubic yards have been dressed into the road beds. Small quantities are used for walks and roadways around stations, for which this material is ideal.

PERSONNEL

More than one hundred men employed at the pit are quartered during the months of operation in the company's camp, which is located near Buford, Wyoming. The quarry is under the supervision of the Maintenance of Ways Department, with W. H. Lowther as Division Engineer and F. P. Nelson as General Foreman.

Short but Important Link Rebuilt as 40-Foot Concrete Road

(Continued from page 62)

DRAINAGE STRUCTURES

Drainage structures on this project included 14 catch basins, of 18-inch double strength vitrified clay pipe with cast iron hoods to trap the gases. On two basins 12-inch cast iron pipe was used to get over the 30-inch water pipe, because, if the line had been run below the pipe, it would have come out below the grade of the sewer.

SHOULDERS

The completed highway consists of four 10-foot strips of concrete with two 8-foot improved shoulders. These shoulders are built of run-of-crusher stone with asphalt penetration, giving a shoulder onto which an automobile or truck can run at any time of the year with complete safety and not have to park on the traveled road for emergency repairs.

QUANTITIES AND PRICES

Earth excavation.....	\$0.87	per cubic yard
Rock excavation.....	3.00	per cubic yard
Borrow	0.75	per cubic yard
Rock in trenches.....	7.00	per cubic yard
Type C surface concrete, 9 inches thick.....	3.25	per square yard
Preparation of subgrade.....	0.25	per square yard
Catchbasins	100.00	each
Type D inlets.....	70.00	each
18-inch double strength vitrified clay pipe.....	2.25	per foot
10-inch double strength vitrified clay pipe.....	1.25	per foot
Resetting and raising manholes.....	5.00	each
Resetting monuments.....	5.00	each
Extra reinforcing.....	0.03	per pound
Shoulders, 9 inches at concrete, 6 inches at curb	0.45	per square yard
2,000 cubic yards of top soil.....	0.75	per cubic yard
12-inch cast iron pipe.....	4.00	per foot

PERSONNEL

The contract for this 0.892-mile concrete job was awarded to George M. Brewster & Son, Bogota, N. J. For the contractor, Thomas J. Catlaw was Superintendent with Daniel Melchiorre as General Foreman and Andrew Melchiorre as Concrete Foreman. For the New Jersey State Highway Commission, the work was done under the direction of R. M. Beck, Division Construction Engineer of the Metropolitan Division with offices at Newark, N. J., with David Pettigrew as Resident Engineer.



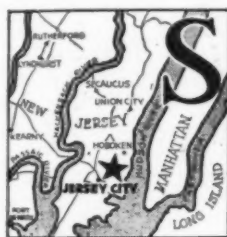
International Trucks and Northwest Shovel Working in Big C. P. R. Cut in Saskatchewan

Construction Plant *and* Methods

on the

New Lackawanna

Freight Terminal



HORTLY after the states of New York and New Jersey decided to build the Holland Tunnel, the Delaware, Lackawanna & Western Railroad authorized the purchase of six blocks of property in Jersey City lying between Henderson Street on the east and Jersey Avenue on the west and from

Sixteenth Street on the south to Eighteenth Street on the north for the construction of a combination dry storage warehouse and light manufacturing unit. The railroad's yards and terminal properties adjoin this new acquisition on the north and east. The six blocks were covered with dwellings, stores and factories.

The building proper consists of 8 stories and a basement with 1,180,000 square feet of storage space. It is 846 feet long and 162 feet wide. The tracks are at the

at

Jersey City

By

E. J. Moore

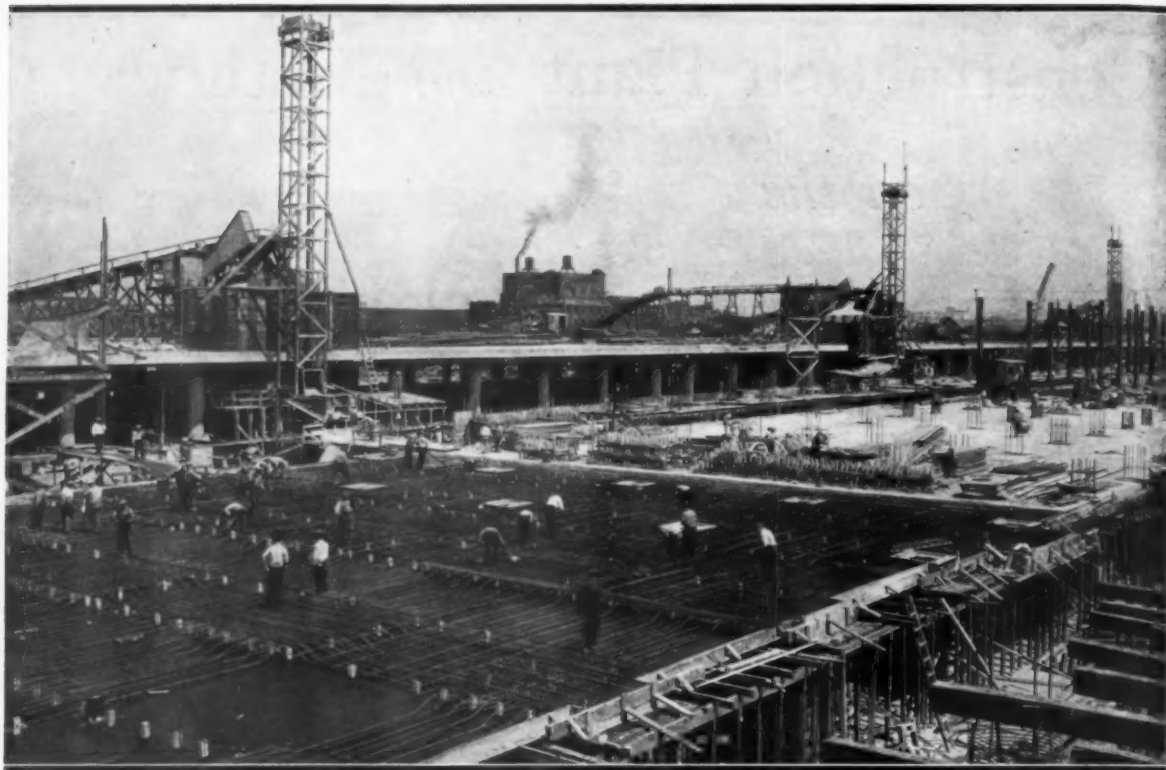
Vice President

Turner Construction Co.

New York



The General Excavation Consisted of Old Fill, Peat Bog, Sand and, at a Lower Elevation, Clay with Fine Sand—May, 1929



Three of the Concrete Towers and Placing of Reinforcing Steel—August, 1929.

second floor level. Four tracks serve the building on the north side and three on the south side. Flat slab construction supports the tracks and platforms and is of sufficient width north of the building for a platform, five tracks and a 40-foot paved driveway. The total width of the structure for the first and second floor is 343½ feet. The area beneath the flat slab will be used for an LCL freight house, driveways and general storage.

EXCAVATION AND BACKFILLING

The site of the new freight terminal was cleared and found generally level at about sidewalk curb grade of + 8 feet. Because of the close proximity of the site to the barge slip connecting with the North River, and test pits showing ground water at 5 feet below grade elevation, it was expected that a serious pumping problem would be encountered.

The general excavation of the warehouse and viaduct site was first carried by steam shovels to 7 feet below grade for the warehouse and 6 feet below grade for the viaduct. The center of the warehouse site was next excavated to elevation 18 feet below grade by two orange-peel buckets operated from the top of the bank with crawler cranes. It soon developed, however, that the pumping problem was not so serious as had been anticipated, as the steam shovels were able to operate in the bottom of the excavation and deliver to motor trucks at the top of the bank in a satisfactory manner.

There was considerable backfilling required around the foundations, amounting to 33,000 cubic yards, and 30,000 cubic yards were needed to form an embankment for railroad tracks on the east end of the north viaduct from Grove to Henderson Streets. A total of

68,420 cubic yards were removed from the site, making a total of 131,420 cubic yards of excavated material handled.

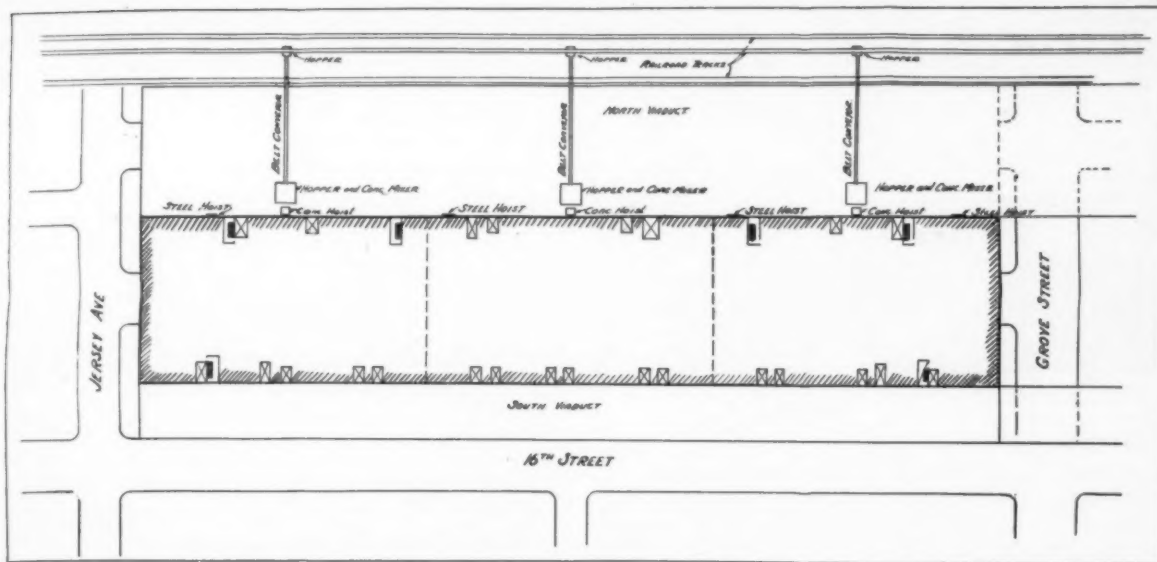
CONCRETE PILES

The installation of the concrete piles followed the different sections of general excavation. Altogether 14,884 piles were driven with five drivers. The piles varied from 16 feet to 34 feet in length for the warehouse foundations and from 12 to 47 feet for the viaduct foundations. Where the requirements for piles for the north viaduct near Jersey Avenue exceeded 38 feet in length, special composite pipe and concrete piles were used.

LAYOUT OF CONCRETE PLANT

The three principal concrete plants were equipped with wooden sand and gravel bins and with an electric motor-driven mixer of 1½-yard capacity, weighing hoppers, a water-measuring device, hoist buckets, wood hoist tower and hopper with two delivery gates.

Cement, sand and gravel were delivered by railroad car. The cement was conveyed from the cars to the three principal plants by roller conveyors and to temporary plants by motor truck. Sand and gravel were taken from the hoppers under the cars and carried by belt conveyors to bins over the mixers of the principal plants and to the temporary plants by a belt conveyor to a loading and batching hopper and then by motor truck directly to the mixer. One portable highway mixer with mast and bucket equipment was used for mixing the greater part of the concrete required for the decks of the viaduct.



Layout of the Lackawanna Freight Terminal Showing the Location of the Unloading Hoppers on the Railroad Track, Belt Conveyors, Aggregate Hoppers and Concrete Mixers, as Well as the Concrete and Steel Hoists

HANDLING REINFORCING STEEL

A crawler crane was used for unloading steel from freight cars to the storage pile. Where storage was on the ground, this crane operated from a point near the railroad cars. Where the storage piles were on the completed viaducts, the crane operated from the viaduct floor. This same crane was also used for hoisting viaduct steel from the ground to the decks and later for hoisting from the storage piles on the viaduct to the floor forms for the second and third floors.

MISCELLANEOUS CONSTRUCTION

For the upper floors V platform hoists were used to transport the steel from the north viaduct to the floor

under construction. Metal forms were used for floor and column forms for both the warehouse and viaduct.

The construction of the walls, both exterior and interior, followed closely the floor construction. Brick, cement block and mortar were hoisted to the different floors by platform hoists and delivered to and taken from the hoists by gasoline driven tractors. One of these tractors delivered the material to the hoists at the lower loading floor and another distributed the material at the working floor, the mortar being transported in wooden boxes and the wood and cement block on special wood platforms.

QUANTITIES

The maximum amount of concrete placed in one day



Progress of Construction on October 23, 1929



Structure Nearing Completion—January 8, 1930

was 1,420 yards, representing 57 carloads of cement, sand and gravel. To this was added cars of reinforcing steel, brick, pipe and other material so that no small part of the construction program was that of the railroad in keeping the work supplied. While this is probably the largest terminal warehouse constructed in the metropolitan district since the construction of the Navy and Army bases in Brooklyn during the war, the care with which the railroad company engineers worked out the design and details and the cooperation they gave during the construction, made the contractor's problem easier than might have been expected for so large an operation.

TABULATION OF THE APPROXIMATE QUANTITIES OF THE PRINCIPAL ITEMS OF WORK AND MATERIALS

General excavation.....	131,420 cu. yds.
Concrete piles.....	14,884
Concrete.....	141,000 yds.
Cement.....	215,000 bbls.
Sand.....	75,000 yds.
Gravel.....	119,000 yds.
Cement floor finish.....	1,284,000 sq. ft.
Steel column cores.....	1,240 tons
Reinforcing steel.....	8,970 tons
Metal forms.....	1,480,000 sq. ft.
Concrete blocks (3½ x 8 x 12).....	1,170,530
Face brick.....	910 M
Sprinklers (Heads).....	14,000
Lighting (Outlets).....	3,300
Elevators (Passenger).....	3
Elevators (Freight).....	20
Elevators (Auto Lifts).....	4
Miscellaneous iron.....	260 tons
Elevator doors.....	19,080 sq. ft.
Jack-knife doors.....	14,800 sq. ft.

PERSONNEL

The new Lackawanna terminal and warehouse was built under the direction of George J. Ray, Chief Engineer, the Delaware, Lackawanna & Western Railroad Co. M. Hirschthal was Concrete Engineer for the railroad. The Turner Construction Co., New York, were the contractors, with W. L. Lozier as Field Engineer and G. E. Larson as Superintendent.

ACKNOWLEDGMENT.—From a paper read before the New York Section, American Society of Civil Engineers.

Cost Accounting for the Highway Contractor

(Continued from page 66)

keeper can prepare for him from the statements rendered as checked against his record of materials received and used on each operation.

CHECKING PRODUCTION AND AGGREGATE

It is well to show the over-runs or under-runs of concrete or any other important factor connected with the paving on the daily report. The timekeeper should

also make out a daily car report for aggregate and cement showing the car number, contents, date placed, date unloaded or released, so that the contractor will know what material has been received and is on hand or unloaded, making it possible for him to order supplies as needed and especially to have materials on hand to forestall any shortage or tie-up of operations. The other duties of a timekeeper or field office man are to make up the payrolls by extending the hours, entering the rates and extending the amount. The amount of the payroll for any given period should equal the total of all daily labor costs summed up for the same period.

INVENTORIES—ACCIDENTS, GASOLINE AND TOOLS

All accidents occurring on the job, regardless of how minor they may seem at the time should be reported to the insurance carrier by the timekeeper on the same day or as soon after they occur as possible. He should keep a daily list of gasoline charged out to each truck or machine operator and on what operation used, so that a check can be made with the statement in the same manner as in the handling of all materials, tools and equipment purchased and used. A monthly inventory of stock should be taken, compared with the quantity received and used as reported by foremen and a report issued. These records are of great service to the bookkeeper who can tie them up with his accounts payable ledger for both the payrolls and the bills rendered, checked against the materials received record monthly, or if an invoice register is used, the same will apply.

LOST TOOLS

One of the greatest losses to any contractor is the lost and stolen tools on every job. If the contractor has a large job, necessitating both the services of a timekeeper and field office man, the field office man should distribute the costs and make up the report and payroll and handle the office work, including the bookkeeping, to give the timekeeper more time to adequately check the labor time and materials and in this case the timekeeper should be held responsible for charging off the tools and equipment to each employee. A report of tools given each employee should be made to the field office man or they should be listed in a book. If the employee quits or is discharged, he should be required to present all tools and equipment furnished him before he is paid off or at least to explain what was done with them. In the case where one clerk serves as both timekeeper and office man on a large job, he should charge the foremen with the tools issued to his men and have the employee secure a clearance slip from his foreman before being paid off in full. A timekeeper and field office man will also have to take care of loans to employees by foremen or others, deducting them from the pay and in the case of a camp, deduct board, lodging and purchases from the commissary.

It's Up to You

YOUR life is an individual experience where you are bound to be used or misused—credited or discredited—successful or stuck.

Did it ever occur to you that your own moves or mismoves largely regulate what happens to you?

Your manners and moods, your own behavior, your thoughts and actions are what count for or against you.—*The Silent Partner*.

Reservoir Excavation

by Scrapers and Sluicing



Leading Material by Power Drag Scraper to One of the Glory Holes Above the Tunnel Under the Lower Level of the Reservoir. This View Was Taken During the Early Stage of Construction

Description of an Unusual

Hydro-Electric Job

in the Andes Mountains

TAKING advantage of unusual conditions, the Compania Hidro-Elctrica Volcan is completing a reservoir high up in the Andes Mountains by dragging the spoil by means of drag scrapers to ground sluicing channels where the material is carried away by water. The Compania Hidro-Elctrica Volcan is the construction unit of the associated Chilean public utilities under the control and technical direction of the Electric Bond & Share Co. of New York. The latest plant built by this company is the Maipo No. 2 which is situated on an elevation of 5,000 feet in the vicinity of Santiago de Chile. It will have an ultimate capacity of 60,000 horsepower.

PREPARATION FOR CONSTRUCTION

One stage in the construction program in connection with this plant was the excavation of Peak Load Reservoir No. 2, having a capacity of 217,000 cubic yards which during the day will store up the overflow from a power canal and during the night will discharge the water to help out on the peak loads of the entire system of the Compania Chilena de Electricidad, Limitada. This reservoir is roughly 1,180 feet long, 325 feet wide and 40 feet deep and required the excavation of about 240,000 cubic yards of material. The site of the reservoir is a sloping valley at the foot of a great mountain cliff and the material to be handled is a tough clay



*AERIAL VIEW OF THE RESERVOIR IN THE ANDES MOUNTAINS NEAR SANTIAGO DE CHILE
This view is too small to show construction details, but does show the canal and tunnels on the lower side*



In the Latter Stage of Construction the Banks of Rock and Earth Were Loosened by Blasting and Washed by an Hydraulic Giant Into the Path of a Power Scraper

which had to be broken up by black powder, with boulders reaching a volume of 2.5 cubic yards.

The first step in the construction was the driving of three tunnels under what was to be the floor of the reservoir with risers to the surface to be used as glory holes in the same manner as in certain mining operations.

SCRAPERS SET UP

Following this construction the actual excavation of the reservoir was started by a number of 1-cubic yard Sauerman Crescent power scrapers and 54-inch Sauerman hoe-type scrapers, each scraper being set up to drag material onto a grizzly over one of the glory holes. Oversize was broken down in the grizzly and the material was washed away through the tunnel.

As the work progressed the percentage of heavy boulders increased and the method of operation was modified by building the permanent washing canal along the north berm of the reservoir with sluice gates at frequent intervals and ground sluicing channels from each sluice gate to one of the glory holes. Then the material from the banks at each side of each of these sluicing channels was broken down by heavy powder shots and sluiced down by a hydraulic mining giant to a scraper running in the sluicing stream. By this means the spoil was discharged into the glory holes and washed away through the tunnels.

Photographs and data on this project were supplied



A 1-Cubic Yard Crescent Scraper Delivering Its Load of Earth to One of the Sluicing Streams

through the courtesy of Sauerman Brothers, Inc., Chicago, by W. C. Butler, Chief Engineer for the Compania Hidro-Elctrica Volcan.

When to Discard Wire Rope

SOMETIMES wire ropes are discarded because the "stretch" is apparently all out of them. The "stretch" is nothing more than the settling into place of the strands of the rope and after this has taken place, the rope is still perfectly good, provided the wires are not broken. Rope stretches very fast at first, but after the strands are firmly set, the stretch for equal additional loads is fairly uniform up to the elastic limit. Lack of stretch, then, should not be considered as an indication of unsafe rope, according to Safe Practices Pamphlet No. 6, of the National Safety Council.

Conditions of wear, corrosion and the number of wires broken are the real indications as to when rope is unsafe. When a new rope is put into service and the wires are adjusting themselves to an equalization of stresses frequently some wires break. This does not necessarily mean that the rope is wearing out or is unsafe. After the rope has had considerable service, however, the breaking of wires does indicate the useful life of the rope is ended, either through wear, corrosion, or fatigue.

The rule of the U. S. Bureau of Mines is that not more than 6 broken wires are permitted in one rope-lay nor that the outer wires be worn more than 35 per cent of their original diameter and that, if the outer wires are worn 30 per cent, not more than 3 broken wires are permitted in one lay. This rule applies to 6 x 19 rope. Continuing the application of this rule, it is recommended that a rope, although it may show little wear, should be discarded if 6 wires are broken in one rope lay; if the outside wires are broken in one rope lay; if the outside wires are worn down 10 per cent, rope should be discarded if 5 wires are broken in one rope lay; when worn 20 per cent, if 4 wires are broken; and when worn 30 per cent, if 3 wires are broken.

It is stated by some of the wire rope manufacturers that the above rule is too severe and that greater lengths of service should be permitted, since tests in their laboratories show that wire ropes with a greater number of broken wires than given above do not break with loads less than the ultimate strength it gives in the manufacturers' catalogs. The rope manufacturers should be consulted by rope users who desire a more economical rope life. One rope manufacturer has stated that his company will test in its laboratory and free of cost to the user the strength of any wire rope made by this company and condemned because of the number of broken wires given above.

Prequalification Required by South Carolina

PREQUALIFICATION of bidders on state highway work was recently made a law when a bill was passed by the State Legislature of South Carolina authorizing the State Highway Commission to fix eligibility requirements for contractors. The bill as drafted contains only those provisions which will insure the selection of experience and responsibility, and does not have any sections restricting the authority of the department to hire responsible contractors from any part of the country.

The bill gives the State Highway Commission the authority to establish such reasonable regulations as the commission may deem appropriate for controlling the qualifications of contractors allowed to bid on work of the State Highway Department. These regulations may fix eligibility requirements for bidders according to available capital and with regard to experience and records of past performances, provided that in no case the eligibility rating of any bidder be influenced by nationality or place of residence.

A Well-Planned Ready-Mixed Concrete Plant

in Jacksonville, Fla.



HIS age of rapid concrete development has brought to the fore the ready-mixed concrete plant. The raw materials, cement, sand and gravel, with the proper amount of water, are mixed in a centrally located "factory" and from there are sent out to the various jobs in the form of "soft"

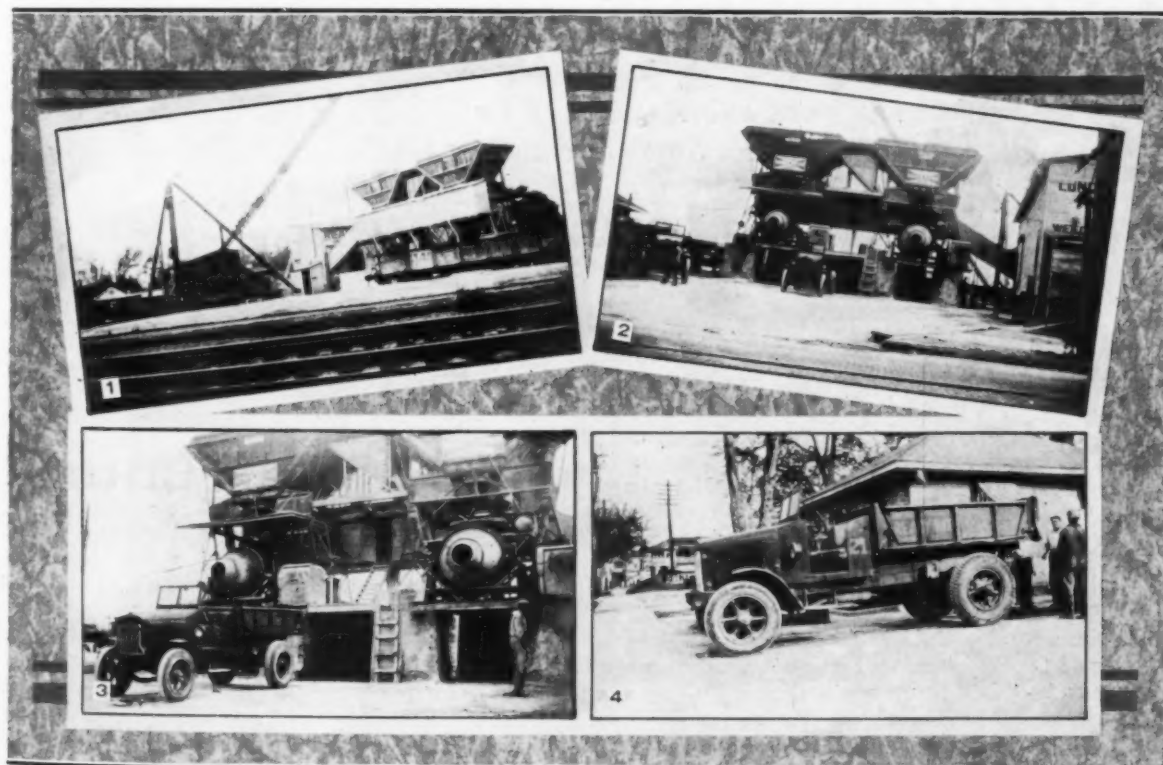
or wet concrete that has taken no initial set. The development of this industry has almost reached a parallel to the package delivery of the big department store. When the ingredients are considered, and the manner in which they are combined and worked to produce the finished product, the ready-mixed concrete plant will be recognized as one of the marvels of the modern construction industry.

The Central Concrete Engineering Co. has been oper-

By
C. W. O'Leary

Superintendent, W. T. Hadlow, Contractor
Jacksonville, Fla.

ating in Jacksonville for the last four years. Numerous improvements have been made in the plant from time



LAYOUT AND EQUIPMENT OF THE READY-MIXED CONCRETE PLANT OF THE CENTRAL CONCRETE ENGINEERING CO.

1. Rear view of the plant showing the spur track, stifleg derrick, duplicate bins and housed cement conveyor.
2. Front of plant showing twin battery of electrically operated 1-yard tilting mixers on concrete piers.
3. Close-up of mixers with truck ready to receive a batch of concrete.
4. One of the fleet of $3\frac{1}{2}$ -ton trucks which deliver the ready-mixed concrete

to time and at the present it is one of the most efficient in the south, fully capable of taking care of all of the concrete needs of the Jacksonville territory.

The plant is located on a spur track on which the material cars are spotted and unloaded. Gravel and sand are unloaded and deposited either in stock piles or directly into the overhead Johnson bins by an O. K. electric stiffleg derrick. The two bins each have a capacity of 90 tons of material. A housed Northwestern cement conveyor, electrically operated, handles the cement bags from the cars to a storage platform in the rear of the bins.

Two 1-yard electrically operated Smith mixers mounted on concrete piers directly beneath the bins are so arranged as to discharge readily into a truck which drives beneath the mixer platform. The mixers discharge by tilting and when both are operating the capacity of the plant is 600 cubic yards for a 10-hour day.

By having two mixers, it is possible to pour concrete of two different specifications at the same time and thus speed up delivery to separate jobs. The discharge hoppers under the bins are capable of being subdivided to cut the batch in the individual mixer to $\frac{1}{4}$ -yard each.

The plant is so arranged that the trucks can turn around, back up or drive diagonally into the street in the quickest possible time. A well-built bungalow on the lot is used as the executive offices from which the

trucks are handled on a time schedule. Next to this is the cement and tool storage shed with a truck rack in front to speed up repairs to the fleet.

TRUCK HAULAGE

The haulage units used by the Central Concrete Engineering Co. include seven International $3\frac{1}{2}$ -ton trucks. They are capable of carrying 3 cubic yards but usually carry only two. They are equipped with four forward speeds and are governed to run not more than 20 miles per hour. The concrete bodies are equipped with removable dividing sections for carrying one yard each of different specification mixes.

CONCRETE OF HIGH QUALITY

The plant manufactures concrete to specifications of 1,500, 2,000 and 3,000 pounds per square foot and regularly has cylinders tested by the Southern Testing Laboratory to check up on plant operation. Each of the component parts of the mix is automatically measured and discharged into the mixers.

In the interests of better concrete, it is a pleasure to see the efficiency of this plant and the results obtained through it. We are a long way from the hazy days when 1:2:4 or 1:2 $\frac{1}{2}$:5 were the governing specifications, without thought of the water cement ratio, workability or designed mix.

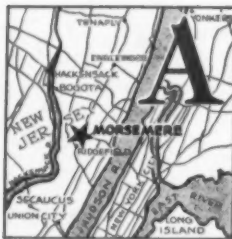
Bridge Building Equipment

*Designed and Assembled by
Contractor's Superintendent*

Saves Time

and

Shows Ingenuity



Part of its program for handling the vast traffic which will develop in 1932 with the opening of the new Hudson River vehicular bridge between Fort Lee, N. J., and 178th Street, New York, the New Jersey State Highway Department is building by contract several bridges connected with long

fills across the famous Jersey Meadows and spanning several small streams and one large river on State Routes 5 and 6.

One of these projects on Section A involves a steel bridge encased in concrete across Overpeck Creek near the Morsemere Station of the Northern Railroad of New Jersey which is part of the Erie Railroad system.

The contractor, A. Guthrie & Co., Inc., showed considerable ingenuity in using the facilities at hand to aid in material handling. When the contract for the bridge was awarded, a trestle previously constructed across the river was purchased and made the basis of concreting operations.

FOUR PONTOONS AND FULL REVOLVING CRANE MAKE SERVICEABLE DERRICK BOAT

Four steel pontoons 8 feet wide by 32 feet long by 7 feet deep made by the Lancaster Iron Works, Lancaster, Pa., were used as the hull for mounting a Marion Model 36 steam shovel stripped of the crawlers. The lower frame was mounted on the temporary timber deck structure which covered the pontoons.

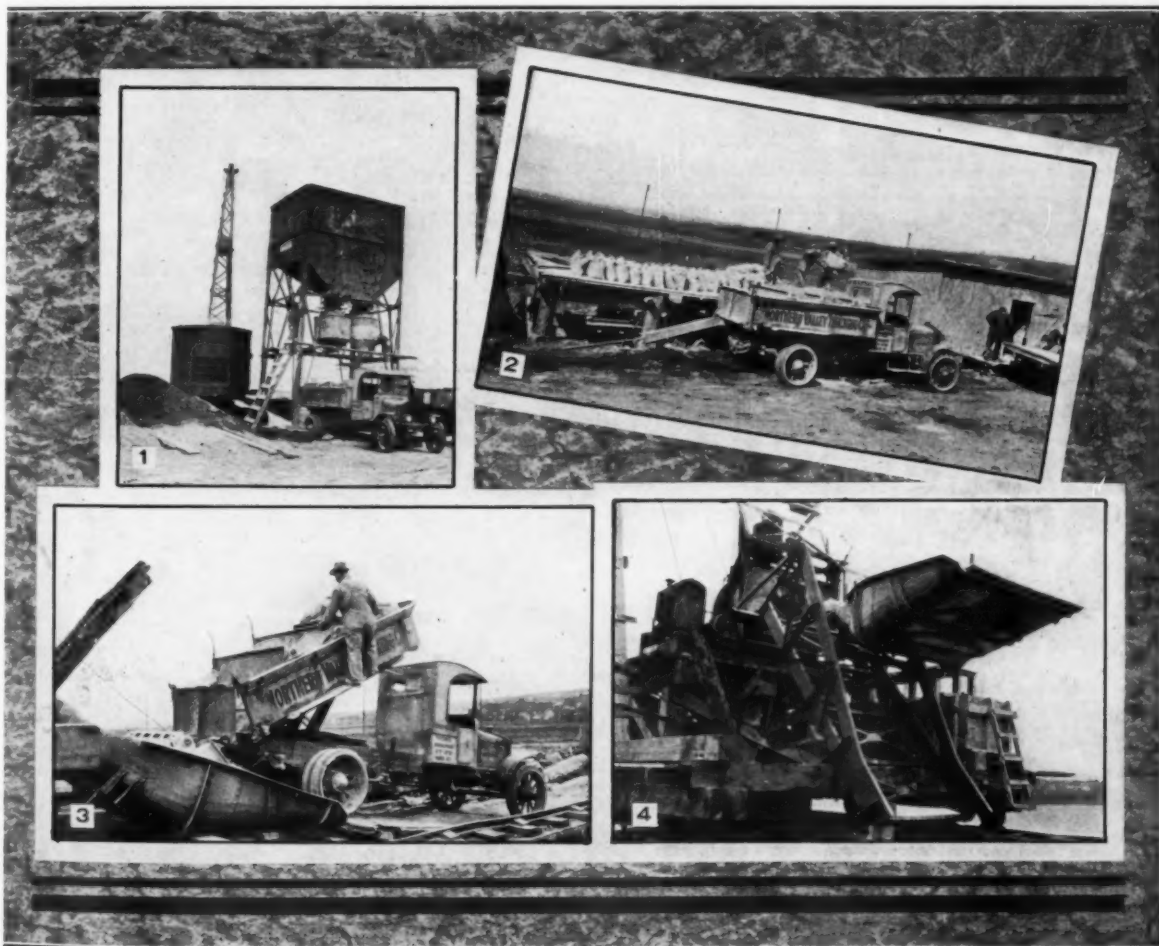
This boat was used for excavation, handling steel sheeting, timber, etc., and for pile driving. The boat was really remarkable as it measured only 32 feet square but easily handled a 6,700-pound steam hammer with a pile in the 75-foot lead. A McKiernan-Terry



The Complete Concreting Plant Showing the A-Frame, Trussed Boom and Suspended Conveyor Mounted on an 18 x 42-Foot Built-up Timber Carriage

9-B-2 hammer was used for foundation piles and a No. 7 for the steel sheeting. The boat was equipped with

a double drum deck engine with the drums mounted beside each other.



PREPARING AND CONVEYING AGGREGATE AND CEMENT TO THE MIXER MOUNTED ON A HEAVY TIMBER TRUCK

1. The Bucyrus-Erie diesel crane which served the Johnson batching plant. 2. Loading the cement onto the batchers. The bags were emptied at the skip. 3. Delivering a batch to the skip. 4. "Going up" about 10 feet to charge the Ransome mixer

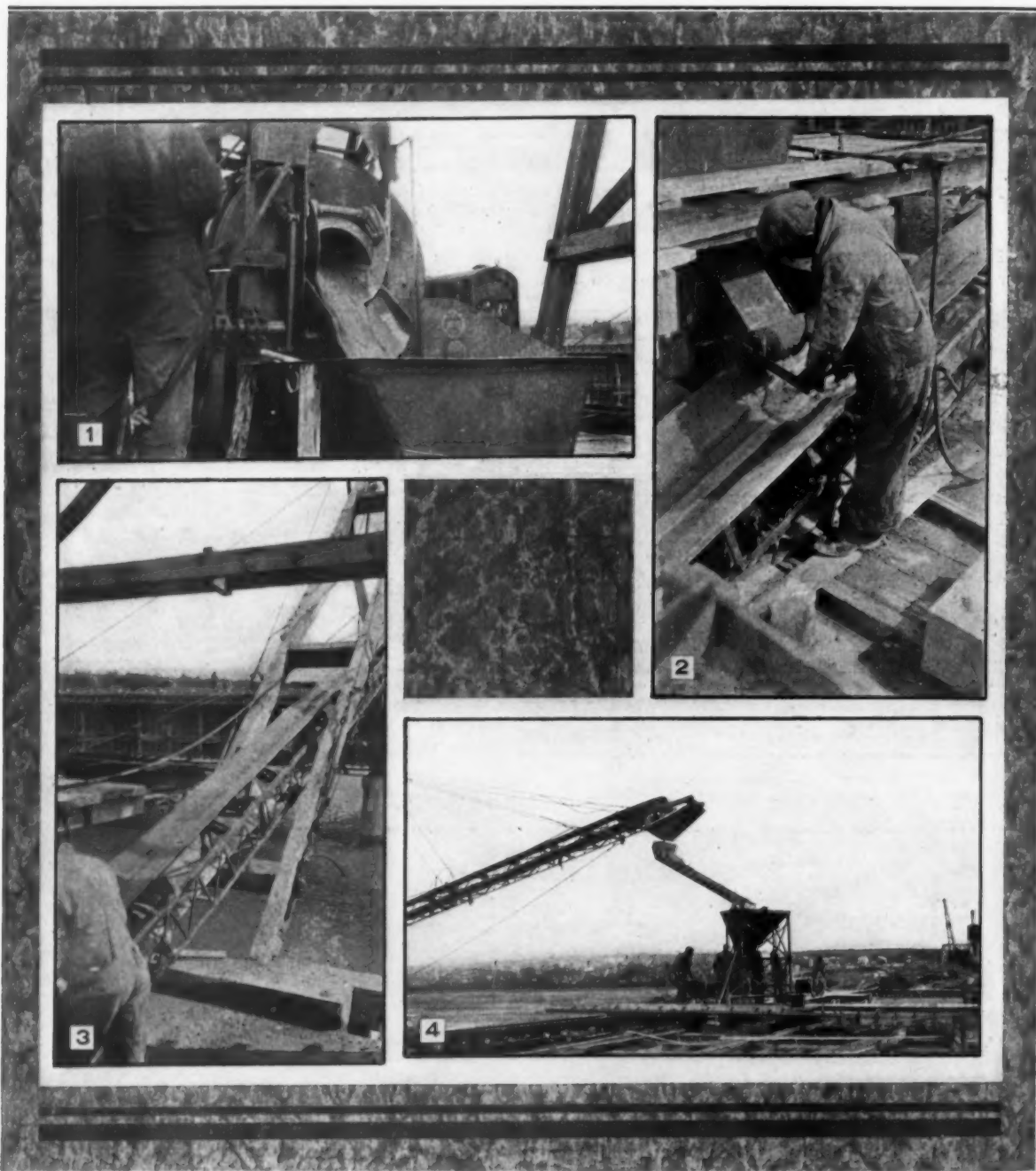
GANTRY WITH 105-FOOT CONCRETE CONVEYOR BELT

One of the largest pieces of home-made equipment which has appeared on any job in the east recently is the wood frame gantry which was designed by the construction superintendent on this job for handling concrete for pouring the piers, encasement concrete and deck slab.

The gantry truck measured 18 feet by 42 feet long and was carried on four pairs of double flanged wheels. It was moved with a Mack truck on which was mounted

a Mead-Morrison winch.

The frame and deck of the gantry were built up of 6 x 12 and 12 x 12 timbers on which was mounted a 28-S Ransome Builders' Special mixer with a power skip which dropped 9 feet 6 inches to the ground and was powered with a Hercules motor. The mixer discharged into an Insley hopper from which the flow of the concrete was regulated to spread it evenly on the 105-foot Barber-Greene conveyor which discharged through chutes into another Insley hopper from which



MOVING THE CONCRETE FROM THE MIXER TO THE FORMS

1. The Ransome paver discharging into the Insley hopper. The Hercules power plant is shown at the right.
2. Laborer controlling flow of concrete from the hopper to the Barber-Greene belt.
3. The belt carrying its load toward the forms.
4. The discharge, showing the swivel chute, the second Insley hopper and the buggies being loaded



FINAL HANDLING OF CONCRETE BY BUGGIES

The batching plant is seen in the back-ground and the cement shed at the left

the concrete was buggied by 6 men to the forms.

The conveyor was suspended from a double wood boom supported by five pairs of cables carried over a 42-foot A-frame of 6 x 12 timbers. The angle of the conveyor was about 20 degrees and its weight was balanced by concrete and stone carried in boxes mounted on the opposite side of the truck.

MATERIAL HANDLING

When handling 1:3:5 concrete for the pier foundations and the 1:2:4 concrete for neat work on the piers, the batched aggregates were purchased from a commercial plant about 4½ miles away and delivered direct to the skip of the mixer after stopping at the cement house on the east shore of the creek to receive the required bags of cement. About 5,000 yards of concrete went into the piers and abutments.

For the encasement concrete, a 1:2:3½ mix, the contractor batched his own aggregates which were delivered and stockpiled on either side of the Johnson bins and batcher on top of the fill at the east bank of the creek. The bins were kept filled by a Bucyrus-Erie E-2 diesel equipped with an Owens 1-yard clamshell.

PERSONNEL

The contract for the Overpeck Creek Bridge which involves five girder spans, one double leaf bascule 70-foot clear span, as well as five piers and two gravity abutments and one pedestal abutment, was awarded to A. Guthrie & Co., St. Paul, Minn., and G. R. Minskey was Superintendent in charge of the work. The bridge was designed and is being constructed under the direction of Morris Goodkind, Bridge Engineer for the New Jersey State Highway Department. J. Krieg is the Resident Engineer on the job for the State.

More and Better Roads in 1930

A DEFINITE and constructive effort to encourage construction during 1930 was made by the Secretary of Agriculture in apportioning among the forty-eight states and Hawaii the \$73,125,000 authorized by Congress for Federal Aid for road construction during 1930. Accompanying this announcement was the statement that all State Highway Departments have been authorized to proceed immediately with

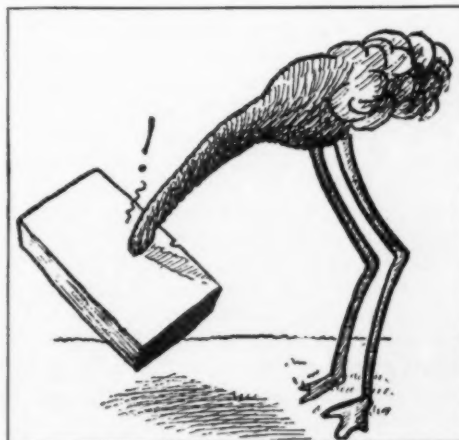
preparations for the expenditure of the newly apportioned funds during the next construction season.

The road appropriations were made as follows:

Alabama	\$1,557,372
Arizona	1,062,190
Arkansas	1,293,086
California	2,501,170
Colorado	1,390,524
Connecticut	477,893
Delaware	365,625
Florida	921,558
Georgia	1,985,632
Idaho	932,594
Illinois	3,100,781
Indiana	1,909,505
Iowa	2,005,944
Kansas	2,048,585
Kentucky	1,414,610
Louisiana	1,040,195
Maine	675,106
Maryland	631,911
Massachusetts	1,090,022
Michigan	2,200,177
Minnesota	2,102,986
Mississippi	1,323,897
Missouri	2,382,383
Montana	1,552,665
Nebraska	1,586,526
Nevada	960,845
New Hampshire	365,625
New Jersey	936,234
New Mexico	1,190,296
New York	3,605,965
North Carolina	1,722,673
North Dakota	1,203,060
Ohio	2,755,528
Oklahoma	1,751,015
Oregon	1,197,667
Pennsylvania	3,314,707
Rhode Island	365,625
South Carolina	1,065,105
South Dakota	1,232,962
Tennessee	1,608,802
Texas	4,545,830
Utah	850,752
Vermont	365,625
Virginia	1,429,253
Washington	1,156,219
West Virginia	792,826
Wisconsin	1,849,169
Wyoming	942,455
Hawaii	365,625
Total	\$73,125,000

Large as this program seems, it will in no way measure up to the road building needs of the nation today. The nation's highway bill for 1928 totaled \$1,659,691,990 and preliminary estimates for 1929 are well over \$1,800,000,000. An additional \$50,000,000 in Federal Aid appropriations to be matched by a similar amount by the states, together with the speeding up of construction generally, will probably mean an increase of \$200,000,000 in road expenditures, according to Thomas P. Henry, President, American Automobile Association.

To this must be added approximately \$500,000,000 a year spent by municipalities for construction and maintenance of streets. It is estimated that the proposed road building program for 1930 will probably mean employment for about 625,000 men.



—Yale Record

The Ostrich That Mistook Wet Cement for Sand

[illegible]

Does Your Bid

There Is a Reason

for
Estimate
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ESTIMATE COST CONCRETE PAVING										SHEET OF
JOB		AGT		MADE BY						
LOCATION		TYPE		CHECKED BY						
SQ. FT.	CU. YDS.	PROPORTION								19
ITEMS OF COST		CEMENT	SAND	AGG.	WATER					
Purchase Unit										
At Source										
Freight										
Hoof										
Total										
Unit Cost										
Basis, Pgs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100										
Total Material										
Quotation From										

I N F O R M A T I O N									
1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Sq. Ft. Per Cu. Yd. Conc.									
L. Ft. Ex. Jm. Cu. Yd. Conc.									
Ft. Bm. Lumber Co. Yd. Conc.									
QUAN.	KIND	@	COST CU. YD.	SQ. FT. 10	SQ. FT. 10	TOTAL COST			
	Bbs. Cement								
	Rock								
	Sand								
	Gr. Gravel								
	Lumber								
	Water								
	Fuel								
	Total Material								
	Form								
	Material to Skip								
	Wks. & Place								
	Finishing								
	Curing								
	Formmen								
	Total Labor								
	Material & Labor								
	General G. M.								
	Excavation								
	Cont. Expense								
	Excavation								
	Regrain Material								
	Ties & Rebar								
	Insurance								
	Auto								
	Total G. M.								
	Total Cost								
	Service Charge								
	Projection								
	Total Cost								

ADD IN THE ABOVE:
 Bank, City, Discount and Int.

By

H. E. Schroeder

Assistant to
Charles E. Heuser

I WONDER how many contractors are using a satisfactory estimating system. By the appearance of bids received by the State Highway Department and various cities within the state of California, I don't believe that a very large percentage of contractors have in use such a system which, in my opinion, is the first step to success in that field called the construction industry.

A job figured on the back of an envelope or on a piece of scratch paper has caused many a man or firm to wish they had never seen a construction job. If they had sat down and thoroughly gone over the job with the aid of a uniform estimating system, the chances are that they would not have gotten the contract. However, if they had been awarded it, there would not have been that thought, "What in h--- was it I forgot?"

Three Different Estimate Sheets for Three Different Kinds of Work Tell Exactly How Much It Will Cost to Take on a Job

Include Profit?

No One Yet Made Money

Bidding Below

Cost

I mentioned above that a good estimating system is the first step toward success in contracting. Let me add that another item essential for success is a detailed cost system.

A RATIONAL ESTIMATING SYSTEM FOR HIGHWAY WORK

After a number of years experience in estimating the construction of road work, Charles E. Heuser has developed the following system which is thorough and yet simple. The system comprises the following forms: excavation, concrete and asphalt paving; curb, gutter and sidewalk work; and a summary sheet. There is no need here to describe in detail the manner in which each sheet is made up. Representative sheets are reproduced with this article and they are all self-explanatory. The thing to be stressed on each different form is the completeness—there is no opportunity for even a detail of the cost to be forgotten. The curb, gutter and sidewalk forms, not illustrated, are practically identical with the sheets illustrated.

The summary sheet consists of a plain, ruled sheet with the following headings: quantity, description, material cost, labor cost, total cost and bid.

After completing the filling out of the detailed forms so that every item in the job under consideration has been accounted for, the total cost figures are transferred to the summary sheet under their respective headings. The summary sheets are then totaled. The material and labor columns should equal the total in the total cost column. After this has been done, a final check is made of all figures in the various forms. When the final check has been completed there is added to the total cost figure that important factor which I believe has often been overlooked by many contractors—that factor is the profit.

DON'T OVERLOOK YOUR PROFIT

I mention that this item had been often overlooked. May I add that many contractors figuring their bids in the absence of a uniform estimating system believe that they have included a satisfactory profit, but they learn at the end of the contract that the estimate was so faulty in omitting important items of cost that the anticipated profit—well, "there ain't no such thing."

After the profit has been taken into consideration, the other items of bond, attorney, discount and interest are added which gives you a figure that is a fair bid—fair to the owner and fair to yourself.

COST ITEMS DIFFER BUT ALL MUST BE INCLUDED IN THE BID

There is no doubt but that nearly every contractor makes up his cost differently. He may be lower than others on some items and higher on others, but a contractor, no matter what his costs are, must consider all of them in making up a bid. A contractor who is in business to make a profit cannot afford to bid lower than cost, plus profit. If he voluntarily neglects to add in equipment depreciation, for instance, he is burning his own fingers. There is no greater fallacy than the belief that a loss on the job being bid will be made up later from the profits on the next job or the one after that. Things like that just don't happen in road contracting.

A New Device for the Field Testing of Concrete

A PORTABLE transverse testing machine which weighs only about 40 pounds but is capable of exerting a force of 4,000 pounds has recently been developed by Prof. Herman C. Berry in the engineering laboratories of the Towne Scientific School, University of Pennsylvania.

The machine is unique in that it satisfies all technical requirements for strength and accuracy and at the same time is light enough to permit an inspector to move it readily from one job to another, thereby avoiding delay in the testing and subsequent opening of new concrete roads.

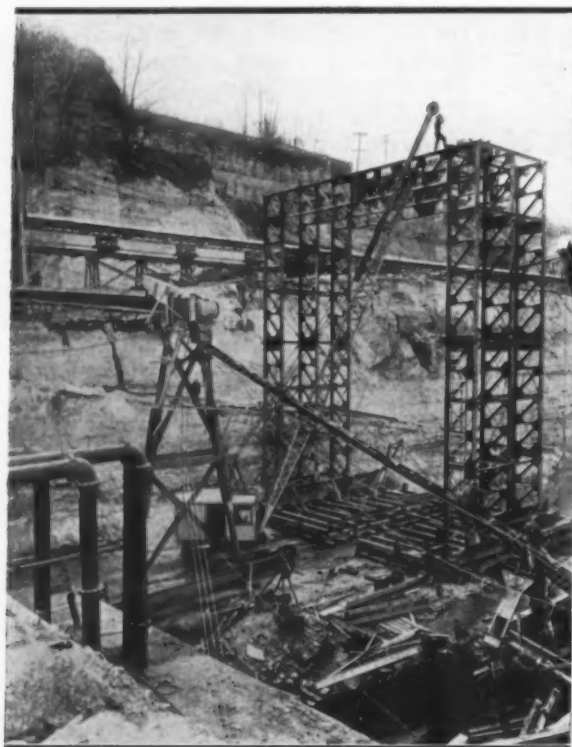
In a number of states, including Pennsylvania, contractors engaged in the construction of concrete roads are required by the state highway department to make sample concrete beams and to test them after different periods of curing. These beams are made from the concrete used at the time the road slab is poured and are cured under similar conditions. It has been found that transverse tests on these beams are more indicative of the quality of concrete than compressive tests on 6-inch by 12-inch cylinders and, as a result the transverse tests have become so well established that it is now the only strength requirement incorporated in the road construction contracts in some states.

The new machine consists of an aluminum alloy frame having a fixed point bearing at one end and a slightly movable point at the other end, so as to prevent the introduction of restraining stresses on the tension side of the beam during loading. On this frame there is mounted a small hydraulic pressure cell on one side of which is a flexible brass diaphragm, 0.01-inch in thickness. The chamber is filled with oil and connected to a common pressure gage which is graduated to record the pounds of load on the diaphragm. A metal disc floats on this diaphragm. Bearing on the disc is a rotating shaft which is threaded at the upper end so as to raise and lower a cross member to which a similar cross member below the beam is attached by two links. This lower cross member is pulled upward by the links against the beam, thus exerting the necessary pressure.

The reaction to the pressure exerted on the beam is transmitted to the diaphragm and then to the gage which indicates the breaking load by a maximum reading hand. After the breaking load has been recorded, the machine can be moved about 12 inches along the concrete beam and a second or check test may be made. The ease with which the pressure can be brought to bear by the machine is evidenced by the fact that the rotating shaft can be turned readily by hand up to a point at which 350 pounds pressure is recorded. Beyond that point the use of a light capstan bar is necessary, but little physical force is required to operate the machine, even when the maximum pressure of 4,000 pounds is being exerted.

*Northern States Contracting Company
Progressing Rapidly in Construction of*

New Lock in Mississippi River



DETAILS OF HANDLING CONCRETE

Concrete delivered by the two belts and chute was placed in the forms through a double spout as shown in the lower right hand corner. At the left are seen the pipes from the pump house discharging over the cofferdam, at the lower end of the lock

FOUNDATIONS for the new locks in the Mississippi River at Minneapolis and St. Paul, Minn., are rapidly being constructed under the supervision of Wildurr Willing, Lieutenant-Colonel, Corps of Engineers, U. S. Army. This project which will extend navigation on the Mississippi as far up as Minneapolis is being handled by two well-known Middle West contractors, The Al Johnson Construction Co., which has built the cofferdam around the lock and the Northern States Contracting Co., of St. Paul, which is building the lock itself. The lock will reach a height of 55 feet and will involve considerable steel work in the superstructure.

The dam in which the lock is located is just downstream from the Ford Bridge. The dam has the hydroelectric power house of the Ford Motor Co. built as an integral part of it.

Which Will Extend

Navigation

to the

Docks of Minneapolis

By

R. L. Cudworth

*Vice President
Borchert-Ingersoll, Inc.
St. Paul, Minn.*

After the Al Johnson Construction Co. had completed the cofferdam, the lock was dewatered and the work of excavation started early in 1930. The Northern States Contracting Co., sublet the excavation which involved about 100,000 cubic yards, 75 per cent of which was solid rock and concrete, to the Connolly Contracting Co., of St. Paul, who carried on the work using Erie shovels and a fleet of Mack trucks. This work included the removal of the land wall of the original lock while the rest of the material was taken out of the bottom, the river wall being left.

The Northern States Contracting Co., with its own forces then started in first building wood forms and pouring a portion of the foundation of the new river wall lock including the conduit or tunnel which is formed by a section of Blaw-Knox circular forms which was started to prevent leakage at this point. A line of steel sheet piling was then driven along the old river wall as well as a quantity of foundation piles, using McKiernan-Terry No. 7 and 9-B-2 pile hammers.

The next step was the construction of wood forms for both the river and land walls on the upper end, but the large Blaw-Knox structural steel forms will move upstream the complete length of the lock as the concrete is poured. A similar form will be erected on the river wall which can be moved along alternately with the land wall forms.

There will be 64,000 cubic yards of concrete in the walls, the lock being 500 feet long and 56 feet on the inside between walls. The work is to be completed in eight months or about September 1, 1930. The gates,



A GENERAL VIEW OF THE MINNEAPOLIS LOCK PROJECT

The Minneapolis end of the Ford Bridge is shown in the background. The concrete mixing plant consisted of two 250-ton Blaw-Knox steel aggregate bins with weighing equipment for sand and cement and two 56-S Ransome mixers are shown on the bank in the upper left-hand corner. The Blaw-Knox traveling form for the land wall of the lock is being erected in the foreground by one of the two Northwest cranes operating on the bottom. The discharge end of the Barber-Greene conveyor for handling concrete is shown in the foreground with two additional conveyors upstream



The Concrete Mixing Plant Showing the Cement Shed, Dual 250-ton Bins and Weighing Batchers, Two Ransome Mixers and the Short Conveyor From the Hopper Discharges to the 300 - Foot Conveyor Mounted on 24-Inch Cars to Move it Along as the Walls are Poured and the Form Moved

which will not be placed until after the walls are poured, involve about 400 tons of steel and are being built and will be installed by the Independent Bridge Co. of Pittsburgh, Pa., on a subcontract.

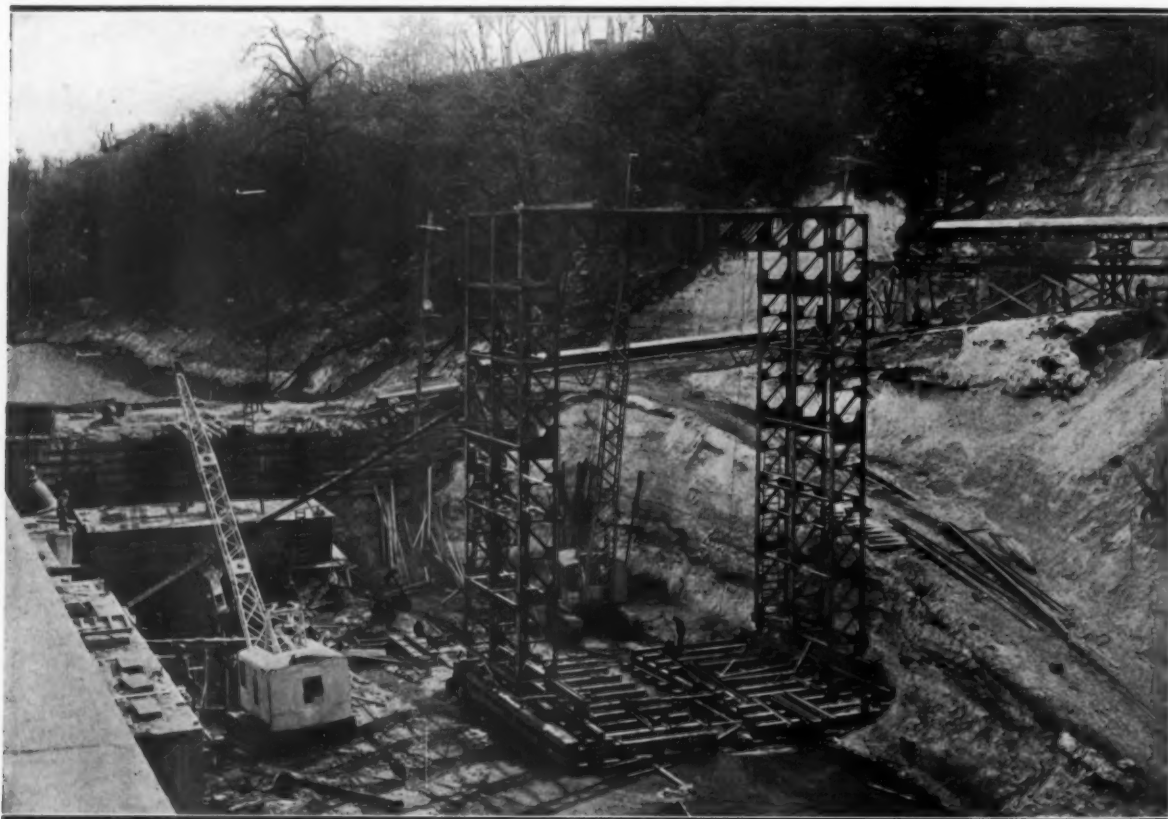
THE CONCRETE MIXING PLANT

The concrete mixing plant which is located on the river bank consists of two 250-ton Blaw-Knox steel bins equipped with weighing batchers for the sand, gravel, and cement and underneath each bin is a 56-S Ransome mixer.

Bulk cement is being used which is stored in a wood bin projecting above the mixing plant. The mixers discharge into chutes which meet at a hopper. The concrete is then carried on a Barber-Greene conveyor which, in turn, discharges into another hopper and then onto a 300-foot, 24-inch conveyor made by the Northern Conveyor & Manufacturing Co., Janesville, Wis. This conveyor is mounted on 24-inch gage tracks so that it can move along the work with the forms. There are several other Barber-Greene conveyors which the 300-foot Northern will feed onto and these, in turn, will deliver concrete to the forms on both the land river walls.

Two Model 7 and one Model 104 Northwest cranes were used by the Northern States Contracting Co. for

(Continued on page 86)



DETAILS OF CONCRETING OPERATIONS AND ERECTION OF THE STEEL TRAVELER FOR THE WALL FORMS

Note the covered Northern conveyor at the right on the bank with the Barber-Greene conveyor carrying concrete to the chute which is held suspended by one of the Northwest cranes. The steel traveler is in process of erection by the second Northwest crane. The pump house is shown immediately in front of the crib cofferdam with the pipes going out over the top of the dam. The gates of the lock will operate in the recess where the man stands at the left of the pump house. This picture was taken at the downstream end of the lock.

How the Other Fellow Did It

Construction Briefs

Don't Begin Hauling Too Soon After a Rain

25. A major factor in the creation of bad hauling conditions on roads in grading operations is the running of trucks over the roads too soon after a rain. This naturally raises the question of idle time losses. In principle the solution of the problem is along the same lines, but the relation of idle time cost to operating cost is in this connection so different that the result is materially changed. To take as an illustration a shovel at \$50 a day, operations at the dump at \$25 a day, and four trucks at \$25 a day each, giving a total operating cost of \$175 a day. As a rule no stock is used on such a job and particularly in the east, no camp is maintained. The only full time men are the job foreman, the shovel runner, watchman and perhaps a timekeeper. Ordinarily the idle time cost will not exceed \$30 or \$40 a day and the difference between the cost of working and of standing idle will be from \$135 to \$145 a day or roughly four-fifths of the average operating costs.

On typical truck haul jobs, it is generally cheaper to remain idle than it is to work unless the output which can be required is near 80 per cent of that which is required to pay the full operating expenses at normal working conditions. 17.5.308

Method of Setting an Iron Fence in a Concrete Dam

26. A practical, though ornamental iron fence, was set atop a large dam in New England, instead of a single rail or two-rail pipe fence, as it was believed to be safer and to give greater protection to visitors. The method of setting this fence in the concrete has proved most effective. Holes 12 inches deep and 5 inches in diameter were left in the concrete for the fence posts and after the fence posts were placed in these holes and lined up, the holes were poured with Hydro-Tite, using a 5-inch split flange at the top as a form. This has made a firm, rust-proof setting. 17.3.136

Water Sprinklers for Curing Concrete

27. A system for curing concrete which eliminates the necessity of hiring several men to sprinkle a pavement with hose lines, thus lowering the labor cost and reducing the replacement in rubber hose was devised by a Colorado contractor. The system includes a series of sprinkler heads attached at intervals along a 2-inch iron pipe line. The type of sprinkler head is that used in lawns where pipes have been placed underground with the sprinkler heads flush with the surface and the entire lawn watered at one time when the water is turned on. The sprinkler heads were placed at the tips of 4-inch lengths of 1-inch pipe which in turn were attached to the water line. The intervals of sprinkler heads varied from 16 to 20 feet depending on the length of pipe in the main pipe line. The spray overlapped sufficiently so that the entire surface was wet down. Just as soon as the concrete set sufficiently to stand the weight of the workmen and the pipe line, which was within 24 hours, the pipe line was extended upon it. A 2-inch rubber hose connected to a fire plug fed the water to the line. There were several connections made with fire plugs to insure sufficient water pressure all along the line. The pipe line was jointed every 16 or 20 feet to make it readily portable. One man supervised the wetting down which is done at intervals of 2 to 3 hours. Under the old system a crew of about 12 men would have been required. 17.4.232

Hooking Up a Centrifugal and a Diaphragm Pump for Unwatering a Caisson

28. A busy contractor faced the problem of unwatering a caisson of wood sheet piling after he struck quicksand. The flow was not sufficient to make it economical to use a 4-inch centrifugal at all times and yet a diaphragm pump was not sufficient. A hook-up was made consisting of a 4-inch centrifugal with a ball-valve in its discharge and by-pass to the diaphragm pump with a ball-valve in the by-pass and another ball-valve on the diaphragm pump discharge. When the water was completely pumped out of the caisson with the centrifugal pump the diaphragm pump kept the excavation dry. When the excavation started to fill up with water so that the diaphragm pump could not handle the extra capacity, the centrifugal pump was primed by the diaphragm and pumped the excavation dry. 17.3.146

Asphalt Spreader Box for a 14-Foot Roadway

29. A Delaware contractor has designed a very satisfactory spreader box for use in laying sand asphalt pavement. The box, which spans the entire width of the 14-foot roadway rides on the 2 x 8-inch planking which makes up the side forms and it is pulled ahead by a tractor. The box is framed with heavy timbers and lined with sheet steel. Two angle irons extend the length of the box. When material is dumped from the trucks the angles have their flat faces horizontal and catch most of the load. They are mounted so that by means of a handle, they can be tilted and thus gradually drop the material onto the subgrade, and, at the same time cut or break down any lumps that may have formed. The rear side of the box has the cutting edge shaped to the cross section of the roadway and strikes off the mix to the proper depth, so that when rolled, it has the desired thickness and shape. This cutting edge is adjustable so that it can be set for either base or top. The spreader box leaves the material with a smooth surface and since it spans the entire width of roadway, little hand touching up is necessary prior to rolling. The roller is able to work close to the spreading operation and good compaction is secured. The thickness of the sand asphalt base course on which this was first used was 4 inches after compaction and the wearing surface which contains the filler was 2 inches after compression. 18.1.48

Lubricate Your Wagons With a Grease Gun

30. Wagons themselves give little trouble on construction work and with a spare wagon in camp lost time due to breakdowns can be almost completely eliminated. On some jobs there is quite a little time lost by permitting drivers to grease the wagons during working hours. Wheels and axle construction on most wagons are of old-fashioned design, not much visible change having taken place for many years. Losses of time from greasing should be eliminated by requiring that wagons be greased in the camp at night and at noon, but the results obtained in this way are not always satisfactory. A much more promising solution has been observed on a number of jobs where contractors have bored the wheel hubs and installed fittings so that grease can be injected with a grease gun without removing the wheels. The whole wagon can then be greased in less time than was formerly required to grease one wheel. 18.1.12

The Care of Wire Rope,

Selection and Application

of Lubricants

By

L. M. Jordan



THE wire rope is not the simple thing it appears to be to the novice; it is a very complex piece of mechanism, and not unlike any other complicated piece of machinery, a knowledge of its composition and operation is required if you are to obtain satisfactory results and maximum life from its use. Also not unlike all modern machinery, its makers are the best qualified to instruct you in its proper care and handling. We will, however, attempt to discuss a few of the pertinent facts that must not be ignored in the handling of all wire ropes.

NO KINKS ON UNLOADING

The proper time to begin considering the care of your rope is the moment it is delivered to you. You should not deliberately and carelessly dump the reel upon which it is wound from the delivery truck or car upon any form of surface, earth, floor or anything else, where there is anything in excess of a very few inches of space through which the reel must fall before striking the surface, because the impact of the fall is liable to break the reel and bruise or kink the rope. In handling the reel, pinch bars should never be applied directly against the rope, but should be used against the flanges of the reel.

Great care should be used not to kink the rope in unreeling it. You can without difficulty prevent kinking if you use judgment and take precaution, and kinks are very detrimental to a wire rope, even if sudden fractures do not immediately result. Wire rope should not be unreel in the manner commonly employed to unreel manilla rope. Mount the reel and carry the free end away from it as rapidly as the rope comes off, or if it comes in a free coil, it may be uncoiled and straightened out by rolling the coil along the earth as a boy does his hoop.

BENDING STRESSES ON SHEAVES

Where the rope bends around sheaves, stress is created in each individual wire, which is commonly referred to as bending stress. The sharper or shorter the bend,

the greater this stress will be. The extreme of this condition is one of the outstanding causes of wire rope failures and poor service, since it causes fatigue of the metal and "porcupining," or breaking short, when the stress becomes excessive. The bending stress sometimes reaches a degree in which, so far as the effect upon the rope is concerned, it will be equal to that caused by the dead weight of the diameter recommended by the manufacturers as that which should always be used, keeping in mind the fact that the greater the diameter of these sheaves, etc., the less will be the bending stress with a given load. Where conditions prevent the using of diameters recommended by the rope manufacturers, you should use a smaller type of higher breaking strength or one of greater flexibility.

SIZE OF GROOVES

Attention should also be given the size of the groove of the sheaves used, for this has much to do with the durability of the rope. These grooves should not be too large, for any excess of the proper size will result in the rope being improperly supported. These grooves should be of a size that the rope will fit into well without pinching or binding on the sides. For rope diameters up to $\frac{1}{4}$ -inch, the diameter of the groove should be approximately $\frac{1}{32}$ -inch greater than that of the rope; for those between $\frac{1}{2}$ -inch and $1\frac{1}{8}$ -inches in diameter, the groove diameter should be about $\frac{1}{16}$ greater than that of the rope; for those between $1\frac{1}{8}$ inches and 2 inches in diameter allow about $\frac{3}{32}$ -inch clearance and for all ropes in excess of 2 inches in diameter about $\frac{1}{8}$ -inch clearance should be allowed.

CORRUGATIONS

Corrugations formed on the surface of sheave grooves should be promptly removed by turning them off in a lathe, else considerable of the rope's life will be sacrificed by the cutting action of the sharp edges of the corrugations.

The rapid forming of corrugations in the groove of a sheave indicates that the unit radial pressure is too great for the material of which the sheave is made. Such a condition necessitates the frequent replacement of the sheaves. This condition can be remedied by substituting a sheave of harder material, as for

instance steel or chilled iron in place of cast iron.

All drums, rollers and sheaves should rotate freely, and to insure this, proper lubrication of their bearings must not be overlooked. If economy is to be realized in the use of wire rope attention must be given to the alignment of all drums, rollers and sheaves. Misalignment of any of these will cause excessive wear to the rope. A sure sign of this condition in a sheave is badly worn flanges. This results from abrasion of the rope against them due to misalignment.

RUN LIGHT TO BREAK IN ROPE

You would not for a moment entertain the idea of placing a new machine immediately under full load as soon as it is installed, but would run that machine in light, without any load whatever for at least a few hours, paying close attention to all its bearings and movements, then giving it very light loads to begin with, and gradually increasing them with more practice. The same conditions should prevail in the initial service of a new wire rope of any kind. If it is employed on a power shovel, the shovel should be operated for some time without actually digging, then dig lightly for several strokes.

LUBRICATION

The majority of wire rope users need not be informed that when wire rope is fabricated, the manufacturer impregnates its core with a chemically-neutral lubricant. However, it is not always realized that this initial application is intended for and can only serve to take care of the rope for a limited time, until it is placed in actual service. If maximum life is to be realized, the rope must be efficiently lubricated at frequent intervals. Proper lubrication means, first, the correct grade of lubricant, and second, the rope must be efficiently lubricated at frequent intervals. Regardless of the fact that the life and service is affected considerably by the materials of which it is made, intensity of service, method of winding, presence of water, excessive temperatures, the presence of alkalies or acids, the predominating factor affecting the life and service of the rope is proper lubrication.

Cores of wire ropes are of two principal kinds, those of wire rope center and those of hemp center, the latter being greatest in evidence. Two principal purposes are served by a lubricated hemp core, the maintenance of ample flexibility with a minimum of friction between the internal strands of the rope in addition to their preservation and that of the core itself, and the prevention of corrosion of the inner strands. In addition to the points named, the core serves to provide a reservoir for lubricant to be distributed among the strands in service between applications, and also serves as a cushion for the inner faces of the strands. It can therefore be readily seen that a wire rope ceases to receive lubricant with a dry core.

It is not the writer's intention to create any impression that wear in any form of wire rope can ever be entirely eliminated, since it is a matter of impossibility to prevent some friction between the individual strands of the rope, just the same as it is impossible to eliminate all friction from the bearings of a machine.

Neither can all friction be eliminated from between the external surfaces of a wire rope and the faces of the sheaves and drums, but friction, with its attendant wear, also excessive bending stresses, can be considerably reduced and to a minimum with the proper grade of lubricant, properly applied. Also deterioration from such agencies as alkalies, acids, water, corrosive fumes and high temperatures can be greatly thwarted through the use of a lubricant possessing qualifications best suited to combat these agencies under the particular conditions existing in any case.

As stated, when wire rope is bent, friction is set up between the inner strands, therefore lubrication is essential to reduce this friction. As deflection has a tendency to squeeze out the lubricant that has been impregnated into the core, the core supply must be replenished, the frequency of applications being governed largely by the service conditions. The larger the sheaves and drums upon which the rope is used the less will be the sharpness of the bends of the rope in passing around them, and therefore the smaller will be the quantity of lubricant squeezed out of the core, which allows for prolonged periods between applications. To the contrary, the smaller the diameter of the sheaves and drums the greater will be the amount of lubricant squeezed out, and therefore the more frequent will be the necessary period of application. The life of the core is dependent principally upon keeping it continually properly lubricated. Even an axial stress on the rope develops core compression, and aside from this, deterioration results from the crushing action of the rope strands which cut into the hemp core as the rope passes over the drums and sheaves. Not only does an insufficiently lubricated, and therefore dry, core absorb moisture, but it also becomes crushed and its fibres broken. All such conditions have considerable influence upon the wearing qualities of wire rope.

The core of a new wire rope contains considerable of the initial, factory-supplied lubricant, but in spite of this fact, it is always best to replenish the supply immediately after installing the rope in operating position, and before any work is done, more particularly if it has been in storage for any considerable length of time.

CHOICE OF ROPE

Too much emphasis cannot be stressed upon the fact that, if one is to realize maximum life and the best of service from wire rope, consideration must be given the class of service in which the rope is to be used in the selection of the lubricant to be employed. This is important because a lubricant that will render good service on a high speed mine hoist cable will not give equal satisfaction applied to a slow-speed derrick cable; nevertheless there are a number of qualities essential to any wire rope lubricant, regardless of the class of service. These are, first, high adhesive characteristics at any and all times under the severest service punishment to which the rope will be subjected in practice; second, high penetrative ability through or between the strands and into the core; third, the ability of the film of lubricant to spread itself; fourth, freedom from alkalies, acids and other detrimental ingredients which tend to corrode or pit the strands. The lubricant must be of sufficient flexibility that there will be no danger

of the film being removed or opening up so that moisture will be admitted from the atmosphere or otherwise as the rope passes over the sheaves and drums. Wire rope lubricants should not crystalize or congeal, neither evaporate upon continued exposure to the atmosphere, nor be affected by corrosive fumes or moisture.

For a better study of the different types of rope, they may be divided into five classes, i.e., stationary ropes that are exposed to moisture, spray or corrosive fumes; ropes for comparatively light duty; ropes run at high speeds; and heavy duty ropes, running at slow speeds under heavy loads. Each type requires certain characteristics and qualifications of the lubricant to obtain the most satisfactory results, which are not of necessity common to all of these classes.

For those used in stationary work and exposed to corrosive fumes, spray or moisture, either an oil or a grease may be used with equal results, if the lubricant sufficiently adheres to the rope under all conditions of service and provides a suitable protective shield. A straight petroleum product having a viscosity between 900 and 1,100 seconds at 210 degrees Fahrenheit will give gratifying results.

For ropes of light duty and general haulage purposes, a mineral oil of a viscosity of from 200 to 300 seconds at 210 degrees Fahrenheit should be used.

For slow speed ropes that are subject to heavy loads, such as those employed on steam shovels, dredges, cranes and derricks, a lubricant with a heavy body and ample adhesive characteristics, applied cold, will give good results, and also, a straight petroleum product with a viscosity of from 900 to 1,100 seconds at 210 degrees Fahrenheit applied hot, will have equal results, or the same as previously mentioned for stationary ropes that are exposed to corrosive fumes, sprays, etc.

For those serving furnace hoists, logging ropes, derrick falls, coal mine and shaft ropes, including also other high speed ropes operating under heavy duties, a mineral oil with a viscosity of from 500 to 800 seconds at 210 degrees Fahrenheit is recommended.

Due to the fact that tar products are not entirely waterproof and are lacking in lubricating qualities, also that they frequently possess tarry acids that have a tendency to corrode the rope, particularly when in contact with moisture, they should not be used. In addition to these points of objection to these tarry products, when they are exposed to the atmosphere they will in time crack and flake off the strands. Soap-thickened mineral oils are usually inefficient in both penetrating and adhering qualities, though they are capable of being made to the same viscosity as the average straight mineral wire rope lubricant. This refers to greases. With the increase of the speed of any wire rope the viscosity of the lubricant should be lowered.

HOT LUBRICANTS

When conditions permit of such, it is better to employ a thicker, semi-plastic lubricant, applied in a hot, thinned condition, in preference to a more fluid lubricant applied cold. If the conditions in any case are such that other than cold applications cannot be made, a chemically-neutral rope lubricant should be employed. When the rope is subjected to severe abrasive conditions, as in gravel and sand pits, a lubricant possessing a high surface protective ability in addition to

good lubricative qualities is highly valuable.

After care has been properly exercised in selecting a wire rope lubricant to meet the existing conditions in any case, the task of proper lubrication is by no means finished, unless equal care be also exercised in applying it. The best method of application is almost invariably in a hot state, since in this condition the compound will first penetrate the strands and cool down to a plastic filler, which will serve to prevent the entrance of water and will preserve and lubricate the core and inner wires. The best method of accomplishing this is to pass the rope slowly through a bath of the oil that has been heated. Another method that may be employed, yet less satisfactory because of the wastage of lubricant, consists of heating by a steam coil located in a drum of the lubricant and placing same above the rope and providing an outlet through which the lubricant runs onto the rope. To spread the lubricant, a brush is located beneath the rope, with the bristles upward, across which the rope passes.

HAND APPLICATION

Hand methods of applying lubricants to wire ropes are in no case entirely satisfactory, but serve better, of course, than no applications at all. If one is to resort to hand methods, there are a number of which may be employed. In applying by hand, the best method is to use a piece of sheepskin with the wool side turned inward. A swab of waste may also be used, but very poor results will be obtained in either of these methods if the rope is not slowed down enough to allow its surface to take on enough of the lubricant as it passes. In applying to horizontal ropes running at slow speed, one can pour the lubricant onto the rope with a dipper, catching the overflow in a container placed beneath the rope and massaging or working the lubricant in with a bunch of waste or the sheepskin held back of the point where the lubricant is being applied. When applying to diagonal or vertical rope lines, the wool of the sheepskin is saturated with the lubricant and is then held around the rope as it moves slowly through it while being held with the hands or secured in position. Still another method consists of passing the rope through a V-shaped wooden trough set up on the earth or floor and pouring the heated lubricant onto the rope and collecting the excess with a piece of waste that is held near the front of the trough. In any case hand applications are both inconvenient and messy, and where there is very much rope to be lubricated or the periods between applications are short, it is always the best plan to arrange special methods for the task, for which appliances can be made without much difficulty. In arranging such appliances, the fact should be kept in mind that it is always best when possible to apply the lubricant without removing the rope from position.

New Lock in Mississippi River

(Continued from page 82)

dredging with Blaw-Knox Dreadnaught buckets and for handling steel, timber, forms and other general utility service. In addition, an American stiffleg derrick has been used to handle the concrete buckets for placing concrete in the foundation. Several Sullivan portable compressors and an American steam hoist have been used.

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Devoted to
News of Consultants
in the
Civil Engineering Field

The Consulting Engineer

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New York

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Rebuilding a Municipal Water and Light Plant

Office of Burns & McDonnell Engineering Co.

THE rehabilitation of the municipally-owned-and-operated water and light plant of the City of Kansas City, Kans., is of unusual interest, owing to several rather unusual engineering and economical requirements that have to be fulfilled in designing and building the improvements.

The entire task of rebuilding this,—the largest municipal plant in Kansas, and one of the most successful in the United States—was awarded to the BURNS & McDONNELL ENGINEERING Co., Kansas City, Mo., by the Board of Public Utilities, a non-partisan operating body. The first phases of the improvements are now in the construction stage.

Owing to increasing demands upon both the water and light utilities, certain of the improvements were necessary immediately to insure the continued successful operation of the plants. This caused the improvements to be worked out in a comprehensive manner, to be added gradually over a period of twenty years and totaling in cost \$7,857,000.

The first improvement recommended and the one now going forward is the installation of a 10,000-kw. electric generating unit with all modern accessories, and a boiler for steam generation, together with a new building for the housing of this boiler, the companion units to be installed in 1941, 1947 and 1951. Further electrical generating units are to be installed during these years, until by 1951 there will be an installed capacity of 100,000 kw.

The new boilers will all be of the most modern type, using a high degree of superheat, 250 degrees at 400 pounds pressure, and using water-cooled walls. The boiler accessories are all of the latest design, incorporating economizers, air heaters, fans, and superheaters, together with pulverized coal firing, slag tap furnaces and efficient ash removal.

Modernizing the equipment should result in an annual saving of at least \$189,000 in fuel, and \$25,000 in labor.

Improvements for the distribution system are outlined so as to provide sufficient capacity for the addi-

tional load requirements and the rapidly increasing demand for service. The entire thought guiding this work was to provide greater service, and reduce interruptions to a minimum. To this end underground lines have been recommended, connecting the main stations to substations.

In view of these improvements, which are being carried on for the most part by surplus revenue, thus removing the necessity for a bond election, it is interesting to note that the rates for certain schedules are the lowest enjoyed by any large community in the United States, and are 33 per cent lower than those rates demanded for electricity in Kansas City, Mo., immediately across the river and served by a private company.



R. E. McDonnell

The improvements to the water plant and system are not nearly so extensive, nor are they so urgent. However, they are needed. The first step is the installation of a 30 to 36-inch cast iron feeder main 7 miles long from the pumping plant to the reserve reservoir. This work is now under construction. A 25-million-gallon-per-day steam turbine driven centrifugal pump is to be installed. New booster pumps and elevated storage tanks are being constructed. Water softening is also recommended at some not too distant future date. The cost of the suggested improvements to the water distribution system will be about \$750,000.

Change in North Dakota Firm

ANNOUNCEMENT has been made recently of the purchase of the LUCKEY MILLER CO., INC., Fargo, N. D., by A. S. Miller, a member of the firm. The company from now on will be known as A. S. MILLER, Civil Engineer, with a staff consisting of Arthur S. Miller, Deane B. Spalding and Robert W. Brownlee, and will carry on a general engineering practice.

Work now being carried on by the firm includes the purchasing of a state highway right of way, plans for paving and bridge work, a drain cleanout, water system and a county garage. The firm is also supervising the construction of some county highways and bridges.

The Consulting Engineer

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H. Eltinge Breed, Consulting Engineer, 507 Fifth Ave., New York, closed his Fifth Avenue office on April 1 because of his departure to handle engineering work in Russia. Until his return in the autumn of 1930, his address is care of the College of Engineering, New York University, University Heights, New York, where his consulting practice during his absence is in charge of his associate, Professor Elmer G. Hooper.

Smith and Niles Make Additions to Staff

THE firm of A. H. SMITH & NILES Co., 1521 Nicholas Bldg., Toledo, Ohio, which is composed of A. H. Smith and A. H. Niles, has recently secured the services of Laurance Samson, E. B. Baur and R. G. Smith.

This company is at present working on plans for new water works projects for the cities of Ohio City, Ohio, and Brooklyn, Mich., and for the Trenton-Grosse Isle Bridge over the channel of the Detroit River.

They are supervising the construction of a sewage treatment plant at Sturgis, Mich., and additions to the Adrian, Mich., water works, pumping plant and distributing system.

Building Projects of Atlanta Engineer

AMONG the projects under way in the office of ROBERT S. FISKE, 1421-22 Healey Bldg., Atlanta, Ga., are structural plans of the Jerome Hotel, Columbia, Ga., \$750,000; Lumpkin Law Bldg., University of Georgia, Athens, Ga., \$100,000; a fire appraisal of Doctors' Office Bldg., Athens, Ga., \$200,000; tax appraisal, Fourth National Bank Bldg., Atlanta, Ga., \$400,000; structural plans for the Glenn Memorial Church, Atlanta, \$200,000.

Mr. Fiske is also supervising the construction of the Educational Bldg., North Avenue Presbyterian Church, Atlanta, \$115,000; Butterick Hall, Agnes Scott College, Decatur, Ga., \$265,000; Synagogue and Sunday School Bldg., Atlanta, Ga., \$350,000 and three theaters of 1,000-capacity each, totaling in value \$250,000.

L. D. Brown has recently joined Mr. Fiske's staff.

Boston Firm Has Several Water Works Projects Under Way

WORK which is now being carried on by SYMONDS & STEVENS, 70 State Street, Boston, Mass., includes plans for a new water works system for Hanover, Mass., involving 23 miles of pipe line; new pipe lines and a 1,000,000-gallon standpipe for Putnam, Conn.; preliminary work on the proposed water works for Baldwinville, Mass., and preliminary plans for additional water supply and purification for Billerica, Mass.

This firm, which is made up of Henry A. Symonds and Fred O. Stevens, is also supervising the driving of wells at Hanover, Mass.; the construction of the standpipe at Putnam, Conn.; and new water works at Fayville and Chatham, Mass.

They were recently called as expert witnesses in a law suit in Rochester, N. H., for damages caused by the vibration of a diesel engine.

Lincoln, Nebraska, Engineer Presents Papers

A JOINT paper was presented by Roy M. Green, Manager, WESTERN LABORATORIES, 826 Q Street, Lincoln, Nebraska, and W. P. Bentley, Uvalde Construction Co., Dallas, Texas, before the Sixth Annual Short Course in Highway Engineering at the A. & M. College of Texas in April. The subject was "Texas Limestone Rock Asphalt Mixtures."

In May Mr. Green presented a paper entitled "What the Citizen Should Know About the Pavements in Lincoln" before the Lincoln Chapter of the Inter-Professional Institute.

Consulting Briefs

William Stoecker, 650 East Big Bend Blvd., St. Louis, Mo., is associated with W. W. Horner, Chief Engineer for Sewers and Paving for the City of St. Louis in preparing plans for and supervising the construction of the St. Louis Municipal Airport. Mr. Stoecker is also working on plans for a \$6,000,000 project for four sewer districts in St. Louis County. Carl Sitzler, L. M. Schumacher and Roland L. Horton have recently joined the staff as Designing Engineers, with Mr. Sitzler in charge.

Charles Scott Landers, 292 Madison Ave., New York, who has specialized in foundation work for buildings and bridges for 20 years, is at present consultant for the Pennsylvania Railroad for bridges across the Hackensack and Passaic Rivers and for foundation work across the New Jersey meadows. Mr. Landers is also preparing plans for the foundation work of two buildings in New York City, one located at 80 Broad Street and the other at 29 Broadway, and is consultant on the foundations for the new 40-story Gulf Building in Pittsburgh, which is now under construction for the Gulf Refining Co.



Charles Scott Landers

J. L. Becton, Civil Engineer, Box 594, Wilmington, N. C., recently completed plans for a \$218,000 paving, storm and sanitary sewer project for Wilmington, N. C., bids for which were received in March.

Howard R. Green Co., Consulting Engineers, Bever Bldg., Cedar Rapids, Iowa, are engaged in the preparation of plans and reports for a sewage treatment plant for Cedar Rapids, paving projects for Vinton, Washington, Olin, Clarence and Ladorna, Iowa; storm sewers, Tama and Olin, Iowa; a swimming pool for Vinton, Iowa, and a sewage pumping station, Cedar Rapids. They are also supervising the construction of intercepting sewers for Cedar Rapids and a swimming pool, West Liberty, Iowa.

W. G. Stone & Son, Mann Bldg., Utica, N. Y., is engaged in preparing plans for a variety of projects, including a sewage treatment plant, concrete pavements, water softening plant, artisan wells, a factory building and other miscellaneous work.

Ernest P. Goodrich, Consulting Engineer, 175 Fifth Ave., New York City is preparing plans for a grain elevator for the Albany Port District Commission, a zoning ordinance and complete town plan for Ramapo, Rockland County, New York and plans for Jersey City improvement under the New York Port of Authority. Mr. Goodrich was recently called as expert witness in the litigation in regard to the Grand Trunk elimination outside Detroit, Mich.

Major James E. Hewes and Colonel Irving O. Moller have recently joined Mr. Goodrich's staff.

G. D. & H. D. Mendenhall, Consulting Engineers, P. O. Box No. 711, Lakeland, Fla., report that they have recently been called as expert witness in several cases of land litigation and mining damages.

W. E. Buell & Co., Sioux City, Iowa, report that they recently completed plans for sanitary sewer systems and sewage disposal plants for Edgerton, Minn.; Freeman, S. D.; Viborg, S. D.; Custer City, S. D., and Arlington, S. D.; waterworks systems for Concord, Nebr., and Arlington, S. D.; an addition to a power plant for Elk Point, S. D., and sanitary sewers at Remsen, Iowa. The construction of a pavement at Milford, Iowa, the waterworks improvements in Sutherland, Iowa, and the construction of a sewage disposal plant for Redfield, S. D., are being carried on under the supervision of this company.

George B. Gascoigne, 1140 Leader Bldg., Cleveland, Ohio, is now preparing a comprehensive plan of sewerage for the City of Buffalo, N. Y.; contract drawings and specifications for sewage treatment works, Chattanooga, Tenn.; contract drawings and specifications for a storm drain for Ellwood City, Penna., and drawings and specifications for a 42-inch sewage siphon, Elyria, Ohio.

Morris C. Burke, Consulting Engineer, 406-7 Terminal Bldg., Oklahoma City, Okla., is engaged at present in preparing plans for a 40-mile extension of the Beaver, Meade & Englewood Railroad from Hough to Keyes, Okla.

Arthur Noack, 51 Court St., Hackensack, N. J., is planning a sewage disposal plant for Hasbrouck Heights, N. J., a trunk sewer for the Borough of Lodi, N. J., pavements and storm drainage for Garfield, N. J., and pavements for Hasbrouck Heights, Dumont and Saddle River Township, N. J. The construction of sanitary sewers and disposal plant in East Paterson, N. J., is being carried on under Mr. Noack's supervision.

Charles Foster, Consulting Engineer, 512 Sellwood Bldg., Duluth, Minn., reports that the New Ulm filtration and softening plant at New Ulm, Minn., has been put in operation with Robert Mullin as Superintendent. Mr. Foster continues as consulting engineer.

George W. Simons, Jr., 408 Hildebrandt Bldg., Jacksonville, Fla., is at present preparing a zoning plan and ordinance for Miami Beach, Fla., plans for sewerage extensions for Lake City, Fla., and a zoning map and ordinance, industrial survey and additional city plan studies for Jacksonville. The construction of the \$80,000 Lake City sewage treatment plant which was completed in the latter part of 1929, was carried on under Mr. Simons' supervision.

The Shockley Engineering Co., 800 Graphic Arts Bldg., Kansas City, Mo., is engaged in the preparation of plans for a park drive at Neosho, Mo., for a complete water works and sewer system at Brewster, Kans., and a water works system at Grainfield, Kans. Construction which has been carried on under its supervision recently includes water works at Hartford, Kans., Manchester, Kans., and Sweet Springs, Mo., and paving around Court House Square, Mt. Vernon, Mo.

Reconstruction of Waterfront Properties by Railroad



Frederic H. Fay

THE Portland Terminal Co., a subsidiary of the Maine Central Railroad, for which company Asa H. Morrill is Chief Engineer, and FAY, SPOFFORD & THOENDIKE, 44 School St., Boston, Mass., are consulting engineers, is engaged in extensive reconstruction of its waterfront properties at Portland and South Portland, Maine. The work includes the construction of a 1,000-foot wharf with a large storage shed at Portland. The storage shed will be equipped with the most modern mechanical equipment for the handling of package freight between ship and shed and between ship and car. There will also be constructed a 600-foot wharf at South Portland with two steel coal towers, each of which has a capacity of 550 to 600 tons per hour in breaking down coal cargoes.

Plans are now being prepared for the construction of a wharf over 1,600 feet in length at Portland, part of which will be used for the handling of china clay direct from ship to car, and part of which will be used for handling pulp wood by means of four gantry cranes direct from ship to car.

The total cost of these three wharves and equipment will be approximately \$2,000,000. Included in this development is extensive dredging in Fore River, both in Portland and South Portland.



Charles M. Spofford

Consulting Engineer Defines Inspection, Its Purposes and Requirements

IN a recent issue of *The Improvement Bulletin* there appeared an article written by Monroe L. Patzig, Consulting Engineer, PATZIG TESTING LABORATORIES, Des Moines, Iowa, the title of which was "Inspection, Its Purposes and Requirements." The present use of the word "Inspection," states the article, is ambiguous, and its meaning or what it should mean varies in the minds and intelligence of different people. To some its use is only to promote sales by indicating thoroughness of manufacture or construction. Others think of it as meaning a visual examination, while some expect it to mean thorough examination both by the use of chemical and physical tests and experienced supervision of every process involved.

Mr. Patzig summarizes his opinion of inspection in the statement that the need for inspection originates in the plans and specifications for any construction work, and that these are necessary to provide for economy, fairness and understanding. The testing and inspection

services required are based on the requirements of the plans and specifications.

Adequate inspection requires, Mr. Patzig goes on to say, that sufficient periodic tests of all raw materials, mixtures and finished products be made by experienced testing engineers and chemists; that all proportioning, mixing or combining of raw materials be properly inspected by trained inspectors; that the placing of mixtures, products, finishing or treating of these in accordance with the plans and specifications, be properly inspected by experienced men; and that proper supervision be provided to combine the individual efforts of the testers, inspectors, engineers, architects, manufacturers, builders and owner, for the purpose of securing fair and honest value for the money expended.

Isaac S. Walker Opens Consulting Office in Philadelphia

ANNOUNCEMENT has been made that ISAAC S. WALKER who, for the past three years, served as Vice President and General Manager of the Scranton-Spring Brook Water Service Co., a subsidiary of the Federal Water Service Corp., and who is well known throughout Pennsylvania, and in all water works circles, has opened an office for the practice of engineering at 750 Drexel Bldg., Philadelphia, Pa. Mr. Walker will give special attention to public utility engineering, including examinations and reports, appraisals, rate investigations, operation and management of water utilities, and to sanitary engineering, including reports, design and supervision of construction and operation of water works, filtration plants, sewerage and sewage treatment works for municipalities, estates and private developments.

Mr. Walker has been actively engaged in these fields for 28 years. His record includes a period of eight years as engineer of construction for the Philadelphia filtration system, for seven years he was associated with the firms of Hering & Fuller, and Hering & Gregory and was identified with the designs for water and sewerage works for many large and small communities. During this period he was also engaged for over two years as a lecturer, and special instructor in extension courses in sanitary engineering at Columbia University. For two years he was designing engineer and division engineer in charge of the sewage treatment works for Philadelphia. For a period of nine years he served as Chief Engineer and General Manager, Secretary and President of the water companies owned by the Bucknell Estate, including Chester, Pa.; Vincennes, Ind.; Greencastle, Ind., and the Delaware Water Supply Co. of Delaware.



Photo by Ace Hoffman
Isaac S. Walker

Charles L. Wood, Consulting Engineer, 817 N. 5th Ave., Columbus, Miss., reports that he is preparing plans for two steel bridges for Lowndes County, five ereosote pile and timber bridges and three concrete culverts.

Well Known Georgia Engineer Dies

WORD has been received recently of the death of William Morrison Robinson, of Augusta, Ga., who since 1923 had been associated as a consultant with his son, WILLIAM M. ROBINSON, JR., Civil and Valuation Engineer, 701 Marion Building, Augusta, Ga.

Mr. Robinson was born in South Carolina in 1849 and entered the practice of railroad engineering shortly after the Civil War. He was a charter member of the American Railway Engineering Association. At the time of his death he was President and General Manager of the Augusta & Summerville R. R. Co. and was lately Valuation Engineer for the Georgia Railroad & Banking Co.

Projects on the Pacific Coast

INCLUDED in the work being carried on in the office of BARRY DIBBLE, 120 East Palm Avenue, Redlands, Calif., is a study of the Columbia River for the U. S. Engineers, Portland, Ore., and the preparation of plans for power contracts for the Metropolitan Water District of Southern California. A pumping station of 25 sec. foot capacity for Minidaha Irrigation District, Rupert, Idaho, is being constructed under Mr. Dibble's supervision.

Recent cases in which Mr. Dibble was called upon as expert witness include the City of Redlands vs. Southwestern Home Telephone Co. before the California R. R. Commission and the Nevada Valley Power Co. rate case before the Public Service Commission of Nevada.

Water and Sewage Treatment Projects in Pennsylvania

AMONG the work now being carried on by W. M. H. DECHANT & SONS, 632 Washington Street, Reading, Penna., is the preparation of reports and plans concerning the restoration, cleansing and control of the Schuylkill River; sewage treatment works for the Commonwealth of Pennsylvania; Pottstown and Birdsboro power houses for the Commonwealth of Pennsylvania and water supply and treatment for Shamokin, Sunbury, Pottstown and the Commonwealth of Pennsylvania, Schuylkill Haven, Boyertown and Ephrata.

The construction of treatment works for water supply at Boyertown, Ephrata and Sunbury and the sewage and water supply pumping stations for the Commonwealth of Pennsylvania is being carried on under this firm's supervision.

Son Joins Father in Consulting Practice

IN a report from the office of HOWARD K. BELL, Consulting Engineers, 727 McClelland Bldg., Lexington, Ky., the announcement is made that Grant S. Bell, B.C.E., who graduated in 1929 from Kentucky State University, has joined his father in his consulting practice.

The firm is at present engaged in the preparation of plans for a complete water works and sewerage system to cost \$150,000 for Oak Hill, Ohio, and water works for Flemingsburg and Cloverport, Ky. A filter and pumping plant is being constructed in Williams-town, Ky., under the supervision of this firm.



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The Editor Comments —

Written from the field.

Wytheville, Va.

The low prices that contractors have been bidding on rock and unclassified excavation in Virginia have astounded me. Why should honest-to-goodness contractors go out and give the State their services without getting a proper recompense for the labor and skill involved? If this were in war time it would be a noble thing to do, but if my memory reaches back accurately the twelve years to the time when I was stationed in Virginia and had a few minutes a day to watch construction work there were some profits that were much fatter than those now enjoyed by the road building fraternity in this state. The profiteering was not so much on the side of the contractors after all as my recollections are that labor had a holiday many a time and collected bumper wages for it.

I well recall the start of the construction of a settling basin at the Petersburg water works when a group of carpenters were sent over to set up a cement shed. On the roof of the shed, not more than 20 feet square were 14 carpenters working hard to keep out of each others' way and then all lying down in the sun to rest while someone telephoned that there was no roofing material on the job.

Bluff City, Tenn.

"I regularly move 1,000 yards of earth a day with a $\frac{3}{4}$ -yard shovel," said J. D. Liles, of Bluff City, Tenn., when I was watching his outfit at work on a subcontract near his home town. That is traveling, when you come to think of it. The explanation is that Mr. Liles works his own outfit, operating the shovel himself and keeps the wagons moving. There is to be an article on this interesting job soon, so I must not tell you all about it now.

Mount Holly, N. C.

When I drove up to Mt. Holly to see a concrete paving contract that was listed by the State Highway Department I was astounded to find that it was completed ten days before and the job ready for the final estimate except for a short stretch of shoulders. The contractor, George R. Martin, of Salisbury, N. C., had cleaned up in a speedy manner and was taking his equipment away. The manner in which the machines were taken care of impressed me very favorably. There was the batching plant near the railroad station. Was it simply being knocked down and piled on trucks to be taken to the next job? It was NOT. A mechanic was assigned to paint every square inch of the Butler bin after he had scraped off any rust and loose paint. The Johnson weighing batchers were being similarly treated and everything put into shipshape order. What a pity we don't have such a word as "contractor-like

order."

This reminds me that on the 1,591 miles I have travelled already on this very interesting trip I have seen five derelict concrete pavers, rollers and cranes by the wayside evidently abandoned by some contractor. I only hope that his profits were sufficient to permit him to scrap the outfits, but I doubt that such was the case. I stopped and looked over one of the pavers. It was pretty thoroughly rusted but about \$200 would have put it into working order again. What a pity that the man who owned it could not have put \$5 or \$10 worth of grease on it and saved the machine for future use.

Shoulder Preservation

In Tennessee I noted some work of the State maintenance crews that impressed me very favorably. Unless the shoulder of a concrete road is firm it can be much more dangerous than the ragged edges of poorly maintained asphalt pavements. If by chance you run off the concrete and the edge presents a smooth surface it is next to impossible to get back on the pavement again. When the shoulder is wet and soft you may be in for a nasty accident. In the case of the asphalt pavement at least the ragged edges gives your tire some place to catch hold and you get back on the pavement quickly. No comments are needed on what this may do to the tire.

In Tennessee the maintenance crew was placing crushed stone in the rut formed by tires in the soft shoulder against the pavement and then covering it with earth to bind it and tamping it. As I like to try out anything that is new, whether it is a new stucco paint from California on my house or Colas on my driveway, and they both worked out wonderfully, several times I drove off deliberately at a legal speed into these reinforced shoulders and found them very helpful in getting the car back onto the concrete road once more.

Convicts on Contract Work

Nello L. Teer of Durham, N. C., is using convict labor hired from the State on his contract for surfacing 11 miles of road from Blowing Rock, N. C., east. There will be a rather complete article on this novel labor situation in an early issue of CONTRACTORS AND ENGINEERS MONTHLY. I have mentioned only two of the dozens of articles, all containing some unusual or unique features, which I have lined up or written myself for you to have the benefit of in the remaining issues this year.

Theodore Reed Kendall



When the Dredge Arm Swings Down the Gear Is Submerged and Often Subjected to Violent Shocks

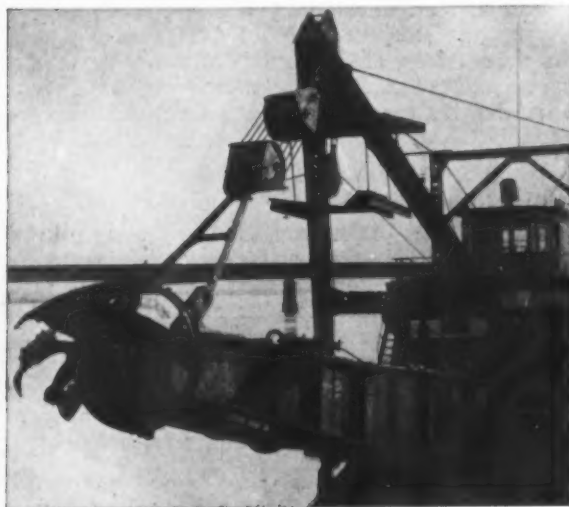
Modern Dredges Are of Huge Proportions

FEW machines need more brute strength than a hydraulic suction dredge. Its great cutter, hidden under the water, digs and tears into whatever material may be on the bottom, and almost anything but very large boulders may be clawed loose and jerked up by the torrent of water through the suction pipe.

The rotary cutter of the dredge illustrated runs at 12.5 rpm and requires 400 horsepower to operate. As the driving motor runs at 250 to 500 rpm a gear reduction is needed. It is severe service because 400 horsepower at a speed of 12.5 rpm means the enormous torque of over 2,000,000 pound-inches. When the ladder or radius arm swings down at 45 degrees, the gear may be submerged in filthy harbor water and violent shocks must be withstood. The gear in the picture, which meets these demands, weighs 25 tons and has hardened gears, roller bearings and alloy steel shafts.

The spring coupling through which a 1,150-horsepower diesel engine drives the suction pump of the dredge New York illustrates the strength required in this kind of work. The diameter of this coupling, the largest of its kind ever built, is 59 inches and weighs 4½ tons. It carries two rows of helical springs, one in the driving and one in the driven half. One-half of the coupling is supported in the other, preventing excessive misalignment.

The huge size of these modern dredges is illustrated fur-



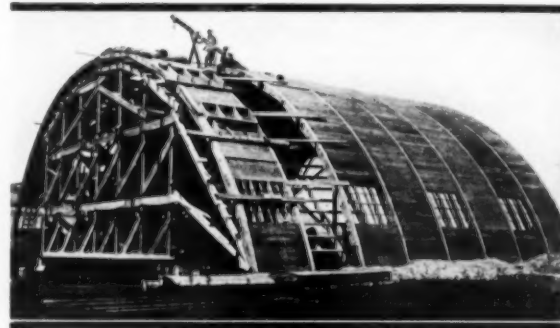
The Great Rotary Cutter Which Turns at 12.5 rpm.

ther in the Las Cruces, built this year to keep the Panama Canal clear. This dredge is diesel-electric, with four main engines of 90 horsepower each, and a main pump motor of 2,500 horsepower. Control is by variable voltage and the generators and motor armatures are connected all in series.

New Hangar with Continuous Wood Arch Withstands Severe Tests

DURING the recent erection of a Notrus hangar at the plant of the Great Lakes Aircraft Corp., Cleveland, Ohio, an engineering test for wind and snow loads was requested by the Engineering Department of the City of Cleveland. Wilbur Watson & Associates, Engineers, Cleveland, who designed the Goodyear Zeppelin hangar at Akron, were employed to conduct the test.

The hangar to be tested was an arch shaped structure from the ground, the distance across the arch being 76 feet and the distance around the arch, 90 feet. The height of the arch



Notrus Hangar at the Plant of the Great Lakes Aircraft Corp., Showing the Eighth Panel on Which the Tests Were Made

was 27 feet. The hangar was constructed of standardized factory-built sectional wood units, 6 x 10 feet in size and shaped to the curve of the arch roof and bolted together. Between each row of panels were bolted three arch ribs 2 inches by 12 inches by 10 feet, the top edges of which were cut to the radius of the arch. Six rows of panels and ribs were erected, the seventh row being omitted, and then the eighth row which served as the test span was erected, thus standing detached from the main structure for the test.

For the snow test the roof of the building was loaded a distance of 25 feet on each side of the crown of the arch with bags of sand, a total load of 19,243 pounds being placed on one row of panels and pair of ribs attached thereto, which was equivalent to a snow load of 30 pounds per square foot. Steel wires with targets attached were hung from the center of the arch and at 10-foot intervals on each side, and as the load was applied readings were taken at these points. The greatest deflection recorded was 2 inches and upon removal of the test load, the structure returned to within ½-inch of its original position.

Wind load tests were conducted by attaching ⅝-inch steel cables to 6 x 6-inch timbers laid horizontally across the roof of the test arch at three equal points on one side of the structure. The steel cables ran horizontally through sheaves attached to the scaffold and then vertically toward the ground and were attached to 8 x 8-foot platform suspended above the ground on which were piled sacks of sand exerting a 30-pound wind load per square foot on the structure. The structure withstood this wind test which represented a 90-mile gale and upon removal of the load the structure returned to within ½-inch of its original position.

Jim Flarrey—First Aider

HE was in a reminiscing frame of mind—was the old steel foreman as he sat in the construction shanty, that cold, rainy, November noon.

"Yes, sir. It takes real guts in a real he-man to be a real first aider." The crowd of us sitting around the stove smoked in silence, for we knew some story would follow to explain this remark.

"Some folks think," continued the foreman, "that just because most first aid material is made out of cloth, first aid should be given by ladies, but—" Again a silence fell, broken only by the sputtering of the nicotine in the bottom of the foreman's pipe.

"Now take that job that Jim Flarrey did. I ask you could any woman do it? The answer is NO—not by a damn sight."

Apparently some knew what job the foreman was talking about but I didn't. I was comparatively new at the building game and this was the first time this foreman had worked for me. So I asked the obvious question. "Well, what was the job that Jim did?" The foreman turned on me those wonderful cold blue eyes of his but in them was the light of pity for the ignorance of one who hadn't heard of "Jim's job."

"Well," he said, "if you ain't heard about it, you should, because after you went down the cable into the sub-cellar after them guys that fell down the elevator shaft you've cut your eye teeth in first aid and know it ain't no lady's job. So here goes. I had my gang working on the building. The derrick was settin' on the tenth tier of steel. We had just set a street column and Pete and Olaf was sittin' on the column heads, waitin' to set the beam which was being swung into place. Olaf was on the column just set."

The foreman seemed lost in thought as he filled his pipe, sitting there in the shanty, looking out of the window with half closed eyes and watching the rain driven against the pane by the hard no'wester. As soon as his pipe was drawing just right, "Jim was sorter right hand to me. And just while this here street beam was being set, Jim was pickin' out the next beam for the derrick to grab. Well, to go back to those column heads again. Gosh, it makes me sick at heart just to think of poor Olaf. But here's what happened. One end of this street beam came in O. K. and Pete set it with his drift. The other end was just out of Olaf's reach.

"Now, say, young feller," the foreman turned those same cold blue eyes on me—this time there was no pity—just sparks to hold my attention, to impress on me the necessity to listen, "Get this picture right. These two boys of mine were sittin' on column heads twelve stories above the street. A clean drop

—nothin' to stop them but the bridge over the sidewalk. Well, as I was sayin', Pete had set his end of the beam but the other end was just out of Olaf's reach, in spite of the derrick man keepin' on boomin' in. So Olaf hooked his right leg over the flanges between which the beam was supposed to go and leaned out for it. Just then the beam came in. And, my God, what it done to poor Olaf—just cut his right leg off in two places. So two pieces of leg went hurtlin' down to that sidewalk bridge and Olaf just hangin' on to that column head a-bleedin' to death.

"Jim saw it all, just as he saw everything that went on and Jim, six feet two, hundred and ninety-two pounds of muscle, not an ounce of fat, arms that could outdo a gorilla, rather fight than eat, all man, from the sole of his feet to the top of that bald head—well, Jim knew he'd be a bit nervous at the job ahead of him, so he crawled along the beam to where Olaf hung on that column head, crawled with his feet on the bottom flange, hands hanging to top flange. And when he got to Olaf he started talking to him like a mother to a poor sick baby, telling him he'd be all right and to hang on while he put on a tourniquet.

"And the tourniquet he used was a handkerchief which he wrapped around Olaf's leg and tightened up, Spanish windlass like, with the handle of his wrench—punching the drift pin end through Olaf's overalls so the tourniquet would stay tight. You get this, young feller, do you; this was all happening on a column head twelve stories above the street, a clear drop to the sidewalk bridge. Well, Jim had given first aid so he just naturally had to finish the job and get Olaf down where the ambulance could get him.

"Jim set the beam with Olaf's wrench, all the time talking to Olaf and helping him to hold on to the column. As soon as Jim set the beam, Peter from the other column crawled out on it and released the chains and the derrick man boomed over so Jim could reach the chain and hook.

"Jim just put one foot in the hook and his arm around the chain and Olaf over one shoulder and the derrickman lowered them down to the sidewalk bridge. Jim carried Olaf into the shanty and then went back to his job as though he'd done nothin' worth talkin' about.

"And now, young feller, if you don't say that was **FIRST AID** in all capitals, I'll knock you dead. And Jim had guts, too, didn't he?"

Then the stillness of the shanty was broken by the patter of the rain and the sputter of the foreman's pipe.

Jim Flarrey was a real **FIRST AIDER**—he had the knowledge of what to do and the "guts" to do it.

From the Safety Service Digest.



EXCAVATION AT THE NEW AKRON, OHIO, AIRPORT FOR BOTH AIRPLANES AND DIRIGIBLES
A Lorain-75 loading part of the 1,150,000 yards of excavation into Euclid track-wheel wagons hauled by Monarch 50 tractors

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L. C. Britton Contracting Co., Jasper, Ala., Commerce Avenue. Organized: May 15, 1926. Bus. vol. E. This company was organized as a partnership with L. C. Britton, C. M. Sartain and John Kilgore as members. L. C. Britton purchased Mr. Kilgore's interest in December, 1927. Officers: L. C. Britton, General Manager. Major contracts: 1926, 12 miles, grading and drainage, Winston County line to Double Springs, Ala., \$145,000; 12 miles, grading and drainage, Winston, Marion and Franklin Counties, Ala., \$72,000; 1928, 12 miles, grading and drainage, Jasper, Ala., to Winston County line, \$82,000; 1929, 2 miles, grading, Mary Lee Road, Walker County, Ala., \$23,000; 2 miles, grading, preparing for pavement, Jasper, Ala., \$12,000; 2¼ miles, grading and drainage, Franklin County, Ala., \$16,000; 3 miles, grading and drainage, Bee Line Highway, Cullman County, Ala., \$26,000; Sipsey River Bridge located at Sipsey, Ala.



L. C. Britton

J. J. McCaughey Co., Chicago, Ill., 205 W. Wacker Drive. Branch offices: Cairo, Ill.; Samos, Mo.; Hickman, Ky. Organized: 1915. Bus. vol. D. This company was first organized in 1882 under the name of McCaughey Bros., and incorporated in 1915 as J. J. McCaughey Co. Officers: J. J. McCaughey, President; F. J. McCaughey, Vice President and Treasurer; D. J. McCaughey, Secretary. Major contracts: 1927, Pennsylvania Railroad Co., cut-off, Troy section; Illinois State Highway Department, Sangamon County; South Park Commissioners, Chicago, Grant Park; 1928, Illinois State Highway Department, Lee, Peoria and Pulaski Counties; Chicago, Burlington & Quincy Railroad, second track, Fountain City, Wis.; South Park Commissioners, Grant Park; 1929, U. S. Government, Cairo River front and new Madrid Spillway; Illinois State Highway Department, Pulaski County; Chicago, Burlington & Quincy, Rock Island yard, third track to Mendota, Ill.; Peoria County, road work. Member: A. G. C. of A. and Chicago Contractors Assn.

W. R. Cole & Sons, Fayetteville, Ark. Branch office: Alpena Pass, Ark. Organized: January 1, 1930. Bus. vol. E. This new partnership was formed when it was decided that Cole Brothers & Denniston, of which Mr. Cole was a member, should dissolve upon completion of their work then under construction. Officers: W. R. Cole, General Manager and Jack M. Cole, Assistant General Manager. Major contracts: (these contracts were completed by Cole Bros. & Denniston under the personal supervision of W. R. Cole) grading and drainage on Clinton-Conway Road Job No. 843, \$67,797.15; Heber Springs-Edgemont Job No. 514, \$25,095.61; Edgemont-Shirley Road, \$31,061.98.

John Phillips Co., San Francisco, Calif., 582 Market St. Organized: December, 1927 (in Nevada). Bus. vol. C. This business was organized in 1920 as a partnership between John Phillips and Roy Stacy. Later partnership interests were extended to C. H. Wahl and W. K. Potts. In December, 1927, these interests were all merged into the John Phillips Co. Officers: John Phillips, President; Roy Stacy, Vice President; W. K. Potts, Secretary and Treasurer. Major contracts: 1927, protective levees in Mexico, enlarging the main canal, Merced Irrigation District, Calif.; reclamation and levees, Tulare Lake Basin; construction main canal, Beardsley project, Arizona; 1928, protective levees in Mexico, construction State Reclamation District 2075; 1929, construction of 23 miles of S. P. line between Klamath Falls and Alturas, Calif., main canal, U. S. Bureau of Reclamation, Minidoka Project, Idaho. Member: A. G. C. of A.

Robert C. W. MacClosson, St. Louis, Mo., 5500 Alaska Avenue. Organized: 1904. Officers: Robert C. W. MacClosson, owner. Type of contracting: all kinds of reinforced concrete work.

James Spencer & Sons Construction Co., Hot Springs, Ark., Box 584. Branch office: No. Fort Worth, Texas. Organized: 1918. This partnership was formed in 1918 and since that time has done work in Texas, Oklahoma, Arkansas, Kansas, Missouri and New Mexico. Officers: James Spencer and Dewey Spencer, partners. Major contracts: grading, 1926-27, Eastern Division, Mo.-Pac. R. R., \$120,000; 1927-28, Arkansas Highway 27, U. S. 70, 17 miles, \$220,000; 1929, Arkansas Highway 6, 10 miles, \$104,000; Benton, Ark., \$85,000; 1929-30, Arkansas Highway 7, 13 miles, \$200,000; 1929-30, bridge, Arkansas Job No. 677, \$36,000.

Walter E. Goat, Buffalo, N. Y., 44 Leroy Avenue. Organized: 1921. Bus. vol. E. Officers: Walter E. Goat, owner. Type of contracting: general building construction of any nature.

Barrett & Hilp, San Francisco, Calif., 918 Harrison St. Organized: 1913. Bus. vol. B. The members of this firm organized the co-partnership in 1913, neither having had any previous business experience. In 1928 the real estate interests of the partnership were separated from the contracting business and incorporated under the name of the Hilbar Properties Co. Officers: John F. Barrett and Harry H. Hilp, partners. Major contracts: 1927, Mare Island Hospital Buildings for U. S. Government; St. Mary's Hospital, San Francisco; first unit of new St. Ignatius College, San Francisco; Green Ophthalmic Institute; National Paper Products Co. plant, Stockton, Calif.; St. Joseph's Hospital, Stockton, Calif.; 1928, St. Agnes Hospital, Fresno; Simmons Co. warehouses, San Francisco; Hibernia Bank, San Francisco; Fibreboard Products, Southgate, Calif.; 1929, St. Joseph's Hospital and Nurses Home, Orange, Calif.; Fibreboard Products, Antioch, Calif.; Federal Container Co., Philadelphia, Pa.; William Volker & Co., San Francisco. Member: San Francisco Chamber of Commerce, Builders Exchange, General Contractors Assn., San Francisco Real Estate Board, California Development Assn., Industrial Assn., National Safety Council, Californians, Inc.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

When Is An Independent Contractor?

When the tax assessor comes around, one naturally avoids exaggeration of his means; but when the representative of a commercial rating agency drops in there is neither motive nor disposition to minimize one's net worth. For much the same reason, one would rather be rated in a social register as an "independent contractor" than as an "employee." But when one is injured and his right to recover depends upon his being rated as an "employee," he is apt to fight to the court of last resort to establish the fact that he is not an "independent contractor."

A case in point is that of the suit of Mr. Cochran of Maryland to get an award under the Compensation Act of his state on account of an injury he sustained while engaged in driving piles on a pier construction job.

The workmen's compensation commission held that he was not an "employee." He appealed to the circuit court, which held that the commission was wrong. Then the "employer" appealed to the Court of Appeals, and that tribunal held that the circuit court was wrong. (North Chesapeake Beach Land & Improvement Co. vs. Cochran, 144 Atl. 505.) The result is an order requiring the case to be heard all over again, with a view to the Court of Appeals declarations quoted below as to what constitutes an independent contractor, as distinguished from an employee:

"The mere fact that he [Cochran] did not definitely agree to drive all the piles needed for the pier did not conclusively establish that he was not an independent contractor. . . .

"And that brings us to the next element in the definition, that an independent contractor is one who 'furnishes and has the absolute control of his assistants.' . . . While as an abstraction as far as it goes that statement is perfectly sound, it does not go far enough to be an accurate guide. . . .

"Nor is the statement that one who executes the work entirely in accordance with his own ideas, or with a plan previously given him by the person for whom the work is done, without being subject to the latter's orders in respect to the details of the work, with absolute control thereof, is an independent contractor, entirely correct. The mere fact that the plan of the work was not given to the contractor before the contract was made or the work begun did not conclusively establish the fact of his dependence, . . . and, while it is usually held that the right of the contractor to control the means of performance is essential to his independence, . . . that principle is obscured by being submitted as an alternative for the requirement that the work must be done in accordance with a plan 'previously given' the contractor."

When Givers Are "Blessed"

Despite the sweet philosophy of those who believe that it is more blessed to give than to receive, men who give their signatures to banks to aid others in borrowing money for their own behoof, or who furnish free automobiles or automobile rides for others, are still digging down in their pockets every day, because the accommodated borrower or the automobile has gone broke.

A decision lately handed down by the Kentucky Court of Appeals (24 S. W. 2d 578) draws attention to disadvantages that may follow from furnishing employees with free use of automobiles for purposes other than furthering the business of the employer. In that case, the employer was exonerated from liability for death of an employee while riding in a car so furnished, but had to defend suit in two courts to establish immunity from liability.

The court also restated the well-settled rule of law that where an employer, or anyone else, gratuitously furnishes the use of a car, he will not be liable for injury sustained by the user, on account of a defective condition of the car, unless he knew of the defect and failed to warn the user concerning that defect.

The court also restated the well-settled rule of law that the mere fact that an automobile is being driven by the owner's employee at the time of an accident does not make the owner liable to the injured person, unless the car was being used at the time in pursuit of the owner's business.

offer, unless the car was being used at the time in pursuit of the owner's business.

Offer to Compromise Not An Admission

One of the most wholesome rules of law is that which says that every man has a right to buy his freedom from litigation, and that his offer to settle a claim against him cannot be treated as an admission of liability in case his offer is rejected.

So, it is not at all surprising to read that the Kentucky Court of Appeals lately decided that where a firm of highway contractors was sued by a city for damages done to streets by a haulage company, the city had no right to rely upon the fact that the contractors had offered to settle the city's claim, which offer was rejected by the city. (Hatfield Construction Co. vs. City of Paintsville, 20 S. W. 2d, 713, decided October 4, 1929.)

When a contractor offers to compromise a claim against him it is always well for him to make the offer in writing in some such language as this: "Disclaiming any liability to you, and for the sole purpose of avoiding litigation, I offer you the sum of \$. . . in full discharge of your claim." This will aid him in repelling any later intimation that his offer to settle impliedly admitted legal liability on his part.

Agreeing on Penalties for Delayed Performance

Said Mr. Sandman to the Board of Education of the City of New York: "I'll make the repairs you want on that building for \$805, and have the job done within 90 days. If I live up to my name and fall asleep on the job, I'll give you \$10 for every day's delay in finishing the work after 90 days."

The Board took him up, but Sandman never started the work, much less finished it.

Two years later the Board relet the job to another contractor at an increase cost of \$168 and then sued Sandman for damages based on \$10 per day after the 90-day period was up. Had the Board gotten away with this claim, it would have meant that for a year's delay in doing \$800 worth of repair work the contractor would have had to pay \$3,650.

But, in an opinion filed by the New York Supreme Court for New York County, (234 N. Y. Supp. 665), the court decided that the Board was not entitled to recover more than the increased cost of the repairs on reletting the job.

The most important point declared by the court is that a daily "penalty" clause of this kind presupposes that the contractor will complete performance of the contract; it does not apply where the job is abandoned.

But the court said that even if the contract provision for \$10 per day as damages for delayed performance was otherwise valid, it was invalid as providing damages grossly disproportionate to those actually suffered. The opinion follows repeated declarations to the effect that even though a construction contract may specify that an arbitrary sum is to be paid by the contractor as "liquidated damages," the provisions will not be enforced where it imposes an inequitable penalty upon the contractor.

"Again," adds the opinion, "plaintiff [the owner] waited one year and eight months to declare the contract forfeited and two years and two months to relet the same work. Such delay by plaintiff might very well be held to have annulled even a valid obligation of defendants to pay liquidated damages."

Applying Payments to Separate Accounts

"Here's a check from Bill Durr," said a lumber company's bookkeeper to the credit manager. "He does not say what items of his account he wants credited. He still owes us for material on the Smith job that he finished last month, as well as for stuff he is using now in building the Jones house. How shall I credit this payment?"

"Does Durr say whether or not this payment is being made out of money received on the present job?" asked the credit manager.

"No," replied the bookkeeper.

"Then apply the check to the oldest items of his account," directed the credit man.

Later it developed that the payment was made out of money paid to Durr by Jones, and Durr's surety on the Jones job insisted that the lumber company had no right to apply that payment to an account of material on another job and then come back on the surety for pay for material furnished for the bonded job.

But in the recent case of *Madison Lumber Co. vs. Bachemin*, 120 So. 508, the Louisiana Court of Appeal upheld the material company.

The court said that the facts that Durr suddenly commenced paying on his old account as soon as he got the new job, and that he customarily paid for materials furnished him for one job out of the proceeds of the next job, were not enough to indicate to the lumber company the source of the money in making the payment above referred to.

But the court strongly hinted that if the check given the lumber company had been drawn by Jones that would have prevented the lumber company from applying it to the account of material furnished on the Smith job.

To Be Pasted in the Construction Company Manager's Hat

One of the easiest ways for a corporation engaged in the construction business to "get in Dutch" is to go to a state other than that in which it was incorporated and perform a job without getting permission from the authorities of that state to do business there.

Under the United States Constitution an individual contractor or firm of contractors has as much right to do business in a state other than where he or they live as any one living in the state. But the Constitution does not recognize the same right in a corporation. A corporation is the creature of the state in which it is organized and can do business in other states on such terms only as those states respectively may impose.

Many states say that a non-resident corporation shall not do business until it has gone through certain formalities in the office of the Secretary of State, which usually include filing a copy of the articles of incorporation, designating some one on whom summons may be served, etc. And in some states failure to do this forfeits right to sue in that state to enforce a contract involving work there.

But in a case decided by the Appellate Division of the New York Supreme Court October 18, 1929, (*Miller vs. Fitzpatrick*, 236 N. Y. Supp. 638), it was ruled that the fact that a construction company organized in another state had not complied with the New York laws relating to nonresident companies did not prevent it from asserting a mechanic's lien in a suit in New York to which it had been made a party defendant. It was intimated, however, that it could not have sued as plaintiff to enforce a lien or its contract.

When Word Is Good As Bond

"General Contractor must have been going up against the races or the stock market, because he is leaving me flat," complained a subcontractor to the owner. "He is away behind in his payments now and I quit."

"Please don't quit, Mr. Sub," besought the distraught owner. "You stick and finish your work, and I'll see that you get your money, all right."

Sub and the owner were both deacons in the same church; so the former took the latter at his word, without insisting that the promise be put in black and white and signed.

In due time the job was completed and General Contractor, to be thoroughly consistent with his previous behavior, failed to settle with Sub. Then Sub looked up the owner and asked him to make his promise good.

"I pay all of my obligations," bragged the owner, "that is, when I have to. But my lawyer says that I am not legally bound by this oral promise I made to you, because there is a law in this state, as well as other states, to the effect that a promise to pay a third man's debt is not binding unless in writing and signed."

"Well, all I have got to say about that is that your lawyer is as devoid of legal knowledge as you are of integrity," heatedly replied Sub.

A lawsuit followed and the owner "got it in the neck," for the court in looking over previous cases of the same kind found that it has always been held that where A receives a benefit from his promise to C to pay him what B owes, in a case of this kind, the promise need not be in writing. Sub's giving up his right to abandon the job because General Contractor was behind in his payments, on the strength of the owner's promise to pay, was a great benefit to the owner and the promise made the owner a direct debtor of the subcontractor, not merely an accommodating guarantor.

The legal principle involved in the above stated fictitious case was lately applied by the Appellate Division of the New York Supreme Court in the case of *Parisi vs. Hubbard*, 235 N. Y. Supp. 220.

Construction Industry News

National Ready-Mixed Concrete Assn., an association to promote the best interests and the betterment of the ready-mixed concrete industry is being formed. A preliminary meeting was held recently in Chicago, at which time an Executive Committee was appointed to formulate the plan and scope of the Association. Members of the Committee are: J. E. Burke, Manager, Ready-Mixed Concrete Co., Pittsburgh, Pa.; Chairman; Alexander Foster, Jr., Charles B. Warner Co., Philadelphia, Pa.; Arthur Avril, Avril Tru-Batch Concrete Co., Cincinnati, Ohio; C. M. Cornell, Boston Ready-Mixed Concrete Corp., Boston, Mass.; Edwin F. Hill, Sales Manager, Transit Mixers Inc., Chicago, Ill., and Arthur A. Levison, Chief Engineer, Blaw-Knox Co., Pittsburgh, Pa. This Committee will get in touch with the entire ready-mixed concrete industry to ascertain their wishes in regard to plans for a permanent association.

Hercules Motors Corp., Canton, Ohio, has appointed Lon R. Smith Assistant Director of Sales. His duties include supervision of export sales and sales promotion among Hercules distributors.

The Paradox Mfg. Co., Arlington, N. J., announces the removal of its Albany office from 467 Broadway to new and improved quarters at 1 Columbia Place. Paul M. Nickerson remains in charge of this office, and will continue to handle the sales and service of Paradox chlorinators in Northern New York and Massachusetts.

Chicago Bridge & Iron Works, 37 West Van Buren St., Chicago, Ill., has announced the removal of its Atlanta, Ga., office to the Rhodes-Haverty Building, where R. M. Campbell will be in charge. This company has also recently opened a new office in the Electric Building, Houston, Texas. J. R. Donaldson, formerly of the Dallas office, is in charge.

Universal Power Shovel Co., Milwaukee, Wis., a division of the Unit Corp. of America, has announced the appointment of R. B. Crenshaw as District Sales Representative in the Chicago district.

Trackson Co., Milwaukee, Wis., has recently appointed the following distributors to handle Trackson equipment for McCormick-Deering tractors: Gierke-Robinson Co., 4th and Ripley Sts., Davenport, Iowa, who will cover the Davenport, Des Moines, Cedar Falls, Fort Dodge, Mason City and Dubuque territory; Zimmerman-Steeple's Equipment Co., 269 East Water St., Portland, Ore., for the Oregon territory; and the Hunter Machinery Co., 16th St. Viaduct, Milwaukee, Wis., and branches at Detroit and Grand Rapids.

American Manganese Steel Co., Chicago Heights, Ill., has announced the appointment of John H. Coghlan as direct representative in the New England States for the sale of Amseo manganese steel castings, which became effective May 15, at which time its representation by Harrington, Robinson & Co., South Boston, Mass., terminated. Mr. Coghlan's address is 92 Broadway, Cambridge, Mass.

Footo Bros. Gear & Machine Co., Chicago, Ill., has announced the appointment of the following additional officers: C. C. Commons, First Vice President and Assistant

Secretary; F. A. Emmons, H. H. Bates and W. A. Barr, Vice Presidents; W. J. Heineman and W. C. Bates, Jr., Assistant Vice Presidents.

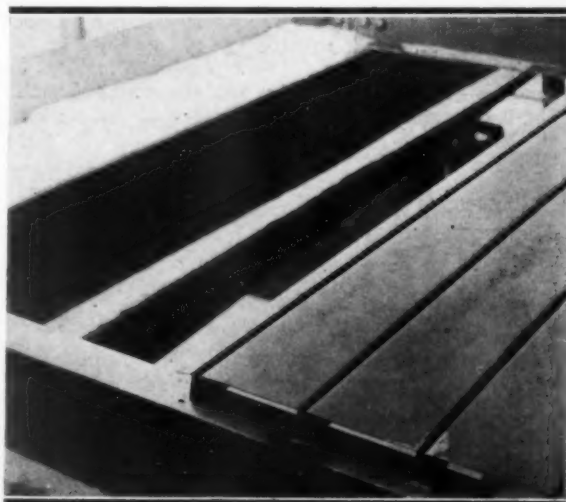
Euclid Crane & Hoist Co., Euclid, Ohio, has announced the recent appointment of Wilson G. Fleming as Manager of Sales. Mr. Fleming was at one time associated with the Drott Tractor Co. and later was Vice President in charge of Sales for the Hi-Way Service Corp. of Milwaukee, Wis.

Unusual Roof Construction on Pennsylvania Building

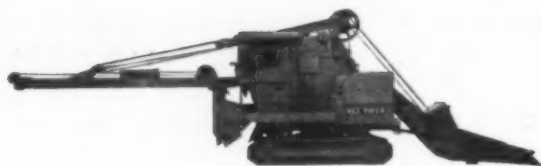
THE new Cold Draw building of the Babcock & Wilcox Tube Co., Beaver Falls, Penna., is of particular interest because of the unusual construction of its roof. The steel roof deck was welded to purlins, the first time that this method of attachment has been successfully employed on an operation of such magnitude. In spite of adverse weather conditions which made the installation difficult, the 99,700 square feet of Fenestra Holorib copper bearing steel roof deck were placed at a speed that compared favorably with the old method of clipping.

Although the fabrication of structural steel frames by the arc welding method has been growing in popularity, it has always been customary to anchor steel roof decks to the purlins by steel clips. On this job, all the welding was done from above and 1,000 squares of roof deck were laid in 16 working days, with two motor generator sets and a crew of 20 men. The end of each sheet was fastened at the base of the middle two ribs, the other end being telescoped 3 inches into the preceding unit. All welds were painted before being covered by the 3-inch lap of the succeeding unit. The sheets at the eaves were the only ones where it was necessary to weld both ends. By welding the center two ribs of each sheet, it was found that the roof had strength sufficient to withstand an inside pressure of 85 pounds per square foot while the telescoping and laps supplied adjustability to absorb expansion, contraction or vibration in the frame. The steel decks were covered with 1/2-inch of insulation and three plies of asbestos waterproofing felts.

McClintic-Marshall Co., were general contractors for the building and the roof was erected by the Fenestra Construction Co., a subsidiary of the Detroit Steel Products Co.



A Unit of Holorib Steel Roof Deck Held in Place by Arc Welds at the Middle Two Ribs



The New Rex 1930 Champion Paver

A New 27-E Paver

A NEW Champion paver, the Rex 27-E, has recently been announced by the Chain Belt Co., Milwaukee, Wis. This paver is built on an entirely new design to take care of present and future specifications for a dryer, quicker setting concrete. The drum with new blades and buckets provides greater leverage for moving dry, heavy and sticky concrete quickly and easily and is still faster in handling present ordinary specifications.

The Rex mechanical man, the fully automatic control in which the cycle can be speeded or slowed, is operated by a one-step foot control. The new skip, wide enough for dual pneumatics, rises to a 52-degree angle in 8 seconds when the automatic anticipating governor opens the engine wide. The new Champion bucket with a straight line drop levels the entire batch into a broad flat ribbon of concrete and the power boom swing places the boom wherever the operator wants it by moving a single lever.

Other features of the new 1930 Rex 27-E are the lower, stronger top frame, and over strength chassis, multiple disc clutches, enclosed transmission running in oil, larger Rex chain drives, Timken roller bearings and a new and larger motor and larger crawler treads.

A Full-Revolving Power Shovel

A NEW full swing power shovel of $\frac{3}{4}$ -yard capacity has recently been announced by the Western Manufacturing Co., Detroit, Mich. All operations of this shovel, which is known as the Ace, the swing, hoist and crowd are hydraulically controlled by a single easily operated hand lever, the system being of the Lockheed type which is used in motor car brakes.

The main frame of the shovel is of heavy cast steel construction, incorporating the heavy internal circle gear, with eight rollers which operate on top of the main frame to insure freedom from dirt and grit. The power plant is a 6-cylinder Hercules engine, developing more than 50 horsepower at 1,400 rpm, its governed speed. The transmission provides two speeds in each direction and has four power take-off outlets. The lower center shaft drives the shovel mechanism direct



The New Ace of Spades

from the engine, while the upper center shaft, geared for 750 rpm, is used for driving the generator when a magnet is required. The left-hand shaft travels at either 500 or 1,000 rpm, and operates the crawler tracks at 1 or 2 miles per hour. The power boom hoist is also operated through the transmission with two speeds available.

The hoist, swing and crowd mechanism is mounted on a heavy cast steel frame with center bearing only, permitting easy removal of either clutch or drum mechanism without disturbing the other.

The boom is of the extension type, extending from 17 to 30 feet, and is standard for all change-over units, including the crane, clamshell, trench hoe, dragline and magnet.

Bigger Overload Capacity Provided by New Trailer

THE greater strength of the new Williams Arch-Girder trailer, made by the G. H. Williams Co., Erie, Pa., is largely due to the unique mounting of the rear wheels, each of which turns on a short individual axle, supported at both ends and without over-hang. These wheels are carried in pairs in rugged cast-steel frames each pivoted on a longitudinal axle so that every one of the rear wheels is kept in contact with the roadway even on a very rough surface. In addition to the free-swiveling action, these wheels have plenty of clearance, so that they will not foul the frame and jam even on the roughest road.



Williams Arch-Girder Trailer

This improved rear end construction of the Williams trailer gives greater strength without increase in weight. Oversize Timken bearings are used.

The side arch girders at the front end are supported by two extra-heavy stiffening members as extra insurance against buckling under severe stresses. The main frame is also of a new and improved design, with sturdier cross-member girders and scientifically distributed weight where needed.

Expansion Joints for Concrete Highways

THE internal stress and resultant action of concrete when undergoing radical temperature changes can be controlled to a satisfactory degree by the allowance of space for expansion or contraction. The exact amount of this expansion or contraction that will take place in a stated volume of concrete, per degree of temperature variance, can be predetermined to some extent. The Corkin expansion joint, manufactured by the Colphalt Co. of Ohio, Western Reserve Bldg., Cleveland, Ohio, can be compressed 44 per cent and will return to within 5 per cent of its original thickness within 24 hours. It is made of granulated cork, asphalt and fillers combined to produce an expansion joint with compression ability and resilience. Concrete can be poured against it without using a supplementary form.

Corkin joint is made to conform to all state, county and city specifications and standard sizes include thicknesses of $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$ and 1-inch with widths of from 4 to 12 inches. Special sizes and shapes can be furnished if desired. No maintenance is required, as it is built in with the road and becomes a part of it.



A Complete Installation of the Cox Slope Retainer

Metal Ditch Controls and Fill Retainers

MANUFACTURED entirely of 16-gage galvanized steel, the metal ditch controls made by the W. L. Cox Mfg. Co., Chillicothe, Mo., require no nuts, bolts, rivets nor screws in any part of their construction. They are made in two styles, the Type A control, which is designed especially for new work, and the Type B, which may be applied to meet any condition.

One man can install one of these units in 10 minutes, according to the manufacturer, and they are easily removed and reset, facilitating reshouldering operations on highways. The controls are driven into the earth and interlap in such a way that the flow of water has no effect on them, although they may be removed with ease by one man. This eliminates excavation and backfilling as is required in the case of wooden ditch checks.

The metal fill retainers made by this company have been developed after studies of the causes of slides. They have been designed to bind and fill in such a way that the weight and vibration of traffic on the top serve to form the earth into a compact mass. Tie-rods run completely through the fill securely tying together the retainer plates on either side of the fill and making it impossible for a slide to start. The weight of the steel and the number of tiers used in fill retainer work depend on the conditions, degree of slope, texture of the earth, etc., but the principle remains the same in all cases. Installation of these fill retainers in no way hampers the free movement of highway or railroad traffic.

This company also makes a slope retainer which is equipped with horizontal troughs to trap the water and carry it to a vertical trough at intervals. This is also all metal and requires no bolts or other fasteners in manufacture or installation.

Filling Cracks in Hard Surfaced Pavements

THE old method of filling cracks in hard-surfaced pavements by cleaning with wire and broom and pouring hot or cold asphalt into a damp or cold crack, is unsatisfactory and often leaves the crack not completely filled or not watertight.

With the Chausse crack repair machine, made by the Chausse Oil Burner Co., Elkhart, Ind., it is possible to blow out the crack with superheated compressed air which not only removes all loose aggregate and burns refuse, but also heats the crack. The tar poured into the hot crack completely fills it and makes a water-tight bond.

These crack maintainers are made in two models, one style being adaptable for use with a separate air compressor. This has a 300-gallon tar kettle with atomizing oil burners which can be instantly lighted and burns distillate or furnace oil. It has a hand spray pump as well as draw-off cock and two hose connected crack and air heaters. It has a warming hood,

steel hoisting davit and chain fall, and is mounted on steel chassis with four steel wheels, roller bearings and solid rubber tires.

Another model is self-contained with gasoline engine driven air cooled air compressor. The crack cleaner and heater is connected to the machine by two hose, one a pneumatic air tool hose for air and one a welding outfit hose for fuel. These are bound together for convenience. The burner is also of the atomizing type, instantly lighted and heats the compressed air which in turn cleans and heats the crack. It is made with small road wheels, is light in weight and easily used in following the cracks.

New All-Steel Hoist for Hard Continuous Service

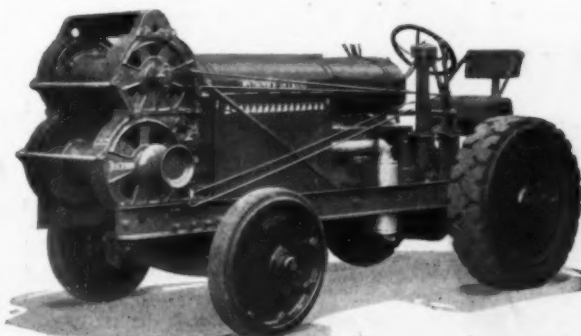
CORRECTLY designed and generously proportioned to insure long life and maximum hoisting profits on such operations as general hoisting in the contracting field, double elevator work, sand and gravel pit dragline operations, backfilling, pile driving, house moving, structural steel erection and other hoisting work, the new Trackson all-steel hoist, made by the Trackson Co., Milwaukee, Wis., has been designed to give uninterrupted service under hard continuous usage.

Some of its special features are larger cable capacity, improved screw type clutches, oversized drum shafts, hand lever control and ready adaptability from a single to a double drum hoist. The auxiliary drum may be attached as needed without any alteration to the main drum unit. It is mounted directly over the main drum, making a complete and compact two-drum hoist.

Installation on either a wheel or crawler type tractor is simple, there being no holes to bore and no construction changes necessary. The hoist is merely mounted on the power unit by means of 6-inch steel channels, which extend from the front of the hoist and are attached to the tractor rear housing.

The machine is built both as a portable hoist for tractor installation and as a stationary hoist. The latter has a material elevator spool which is adapted to endless cable work, such as operating material elevator cages in constructive work. The line speed is 290 feet per minute in both high and reverse gears and 136 in low gear. The elevator spool is interchangeable with the gypsy spool and can be installed quickly.

The clutch in the stationary hoist is of the dog type, transferring the power from the main drum shaft to the elevator spool. This spool can be operated independently of the main drum. The brake is of extra large capacity, insuring long wear to the brake lining and ample ability to hold the load. It is operated by a left-hand lever and locking ratchet.



The New Trackson All-Steel Hoist

New Heavy Duty 6-Wheel Trucks

TWO heavy duty four-wheel drive trucks designed to carry heavy loads at high speeds have recently been added to the line of the Sterling Motor Truck Co., Milwaukee, Wis. The Model EWS-40 has a capacity of 12 tons with a maximum total weight of body and load of 40,000 pounds. The engine is a Sterling six with a Red-Head Ricardo combustion chamber which, it is claimed, reduces gas consumption and increases motor efficiency. The engine has a 5-inch bore and $5\frac{3}{4}$ -inch stroke, 677-cubic inch displacement and develops 126 horsepower governed at 1,800 rpm.

The frame has 9-inch heavy channel beams with wood to reduce vibration and wear and tear on the truck. Bolts are used throughout instead of rivets. The steering gear is of the worm type, making the truck easy to handle. The clutch is a heavy duty Brown-Lipe with 14 driving discs and 14 driven disc. Westinghouse air brakes are used, having 146 square inches of braking service on each rear wheel. The emergency brake is mounted on the propeller shaft.



The Sterling EWS-40 with a $6\frac{1}{2}$ -Yard Wood Hydraulic Dump Body

The transmission has four speeds, augmented by a Sterling patented auxiliary transmission of 9 extra speeds, giving the truck 12 forward speeds in all. The maximum road speed with load is 30 miles per hour. The standard tire sizes are 40 x 8 inches and 40 x 8 inches dual rear, both pneumatics. The two rear axles are heavy duty Timken worm drive and full floating. The front axle has a clearance of 13 inches and the rear axle 10 inches.

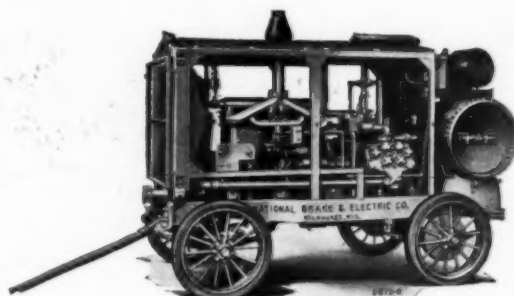
The other model known as the Sterling EWS-36 is of the same design and construction as the EWS-40 but is of 10-ton capacity.

A V-Type Two-Stage Portable Air Compressor

WITH a one-piece cast steel frame and full semi-elliptic spring suspension, and a choice of steel or rubber-tired steel wheels, the Westinghouse-National WN-24 and WN-33 V-type two-stage engine-driven portable air compressors have been announced recently by the National Brake & Electric Co., Milwaukee, Wis.

The compressors are powered with a heavy duty gasoline engine with equipment including an electric starter and automatic control. Both the front and rear axles are oversize and are equipped with roller bearings, thus reducing the frictional resistance to a minimum. The front axle is of the Timken standard truck steer type while the rear axle is the bar type.

The two-throw crankshaft of the National V-type compressor is an alloy-steel drop forging heat-treated and accu-



A WN-24 Portable Gas Engine Compressor

rately counterbalanced. The connecting rods consist of two master rods, one for each high compression piston and four low pressure connecting rods for the low pressure pistons, two of which are connected to each high pressure connecting rod. The air pressure regulator which automatically loads and unloads the compressor when the air tank reaches the predetermined minimum and maximum pressure, is an accurate and sturdily built unit. The centralized automatic control includes the carburetor, air cleaner, pressure regulator and automatic throttle control. The ignition and starter switch are similarly grouped and conveniently located on the instrument panel for one-man starting.

The manufacturers claim that this new V-type compressor delivers more air than any type of single stage compressor of the same displacement; that there is less heat wear on the hose line because cooler air is fed to the receiving tank; that more tools can be operated from it because of its low rating with respect to its actual capacity; and that there is a longer valve life because of the low compressor temperatures which prevent carbonizing, warping and leakage.

A Band Saw with Built-in Motor

THE Monarch ball-bearing band saw made by the American Saw Mill Machinery Co., Hackettstown, N. J., has the motor built into the frame and so protected that no possible injury can result. The guarding enclosure of the upper wheel also protects the saw and can be moved up and down with the wheel and swung open on hinges to allow free access to the wheel for assembling the saw blade. The blade is tracked and the tension adjusted by hand wheels so as not to interfere with the capacity height of the machine.

The frame is cast iron in one piece shaped for rigidity, appearance and non-interference with capacity stock. The front of the lower guard consists of a door which may be swung open allowing free access to the wheel and lower guide. All of the guards are of sheet metal with angle frames stiffening them. The upper wheel is ball bearing and the lower wheel is mounted on the shaft of the ball bearing motor.

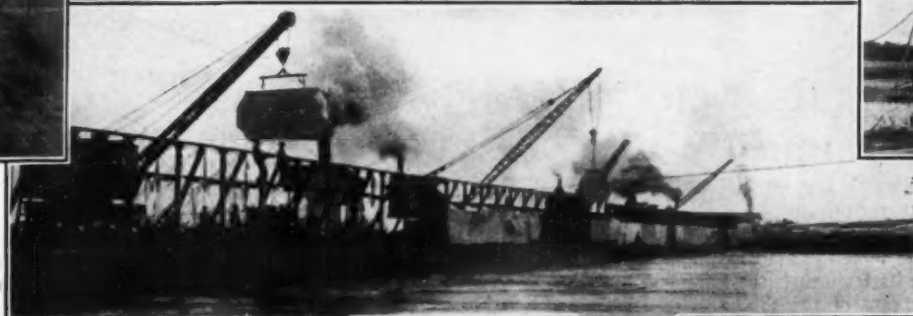


The Monarch Hand-Bearing Band Saw

The Best Equipment Demands

AMERICAN STEEL & WIRE COMPANY WIRE ROPE

On Mississippi River Levee Work



Construction of the Mississippi River Levee system has called into play practically all known methods of dirt moving, such as draglines, hydraulic dredges, tower machines, etc. On this project all types of equipment are being subjected to gruelling punishment and abnormal operating conditions. And—sharing in this responsibility is American Steel & Wire Company American Wire Rope.

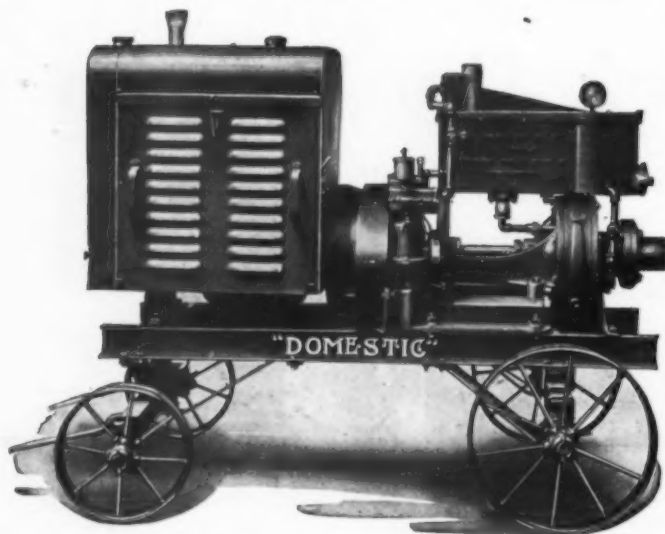
Our wire rope engineers have designed special ropes to fit in with the difficult tasks encountered here. They can help solve your wire rope problems.

American Steel & Wire Company

SUBSIDIARY UNITED STATES STEEL CORPORATION

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The Domestic Self-Priming Centrifugal Pump Unit

An Automatic Priming Pump Unit

A NEW automatic priming ball bearing centrifugal pump unit has recently been developed by the Domestic Engine & Pump Co., Shippensburg, Pa. This pump has been designed to meet the exacting duties of automatic priming and among its features is the large impeller shaft, so designed to take care of the shocks created when an instant change from full load to no load happens. The ball bearings are of large size and carry the radial load and thrust pressures of the pump shaft and impeller. The impeller combines strength and efficiency and is of the disc-backed, wide open passage trash handling type, so designed that it will pass spherical solids approximately one-half the diameter of the intake opening of the pump. Muddy water or water containing a fair percentage of sand can be handled without damage to the impeller blades or reducing the pump's efficiency.

The automatic primer consists of a positive vertical piston type vacuum pump and regulator enclosed in a metal tank. The vacuum pump is equipped with a friction clutch and is driven by a silent chain from the pump impeller shaft. The chain is enclosed and runs in a bath of oil.

The pump is fitted with a special check valve in the discharge port. This valve, the action of which is automatic, when closed permits the vacuum pump to draw the air from the pump and suction line, thus priming the pump whenever the suction line is sealed with water. This automatic control operates to repeat this performance as often as necessary, thus keeping the pump working at maximum efficiency possible with the volume of water available.

The Increased Use of Light Trucks with Trailers and Semi-Trailers

A MARKED increase in the use of light trucks in combination with trailers and semi-trailers is being reflected in the sales of Model AA truck chassis, according to officials of the Ford Motor Co., Detroit, Mich. This is particularly true, they say, among owners of large fleets of trucks.

Factors influencing this new trend are economy of operation, ability to maneuver in tight places and time saved by

disconnecting the trailer unit while it is being loaded or unloaded. By using a semi-trailer on a light truck chassis, the major portion of the load can be balanced over the trailer axle with only enough weight over the rear axle of the truck to give good traction. Thus, by taking advantage of the drawbar pull of the truck, 3 or 4-ton loads can be hauled easily by a 1½-ton chassis.

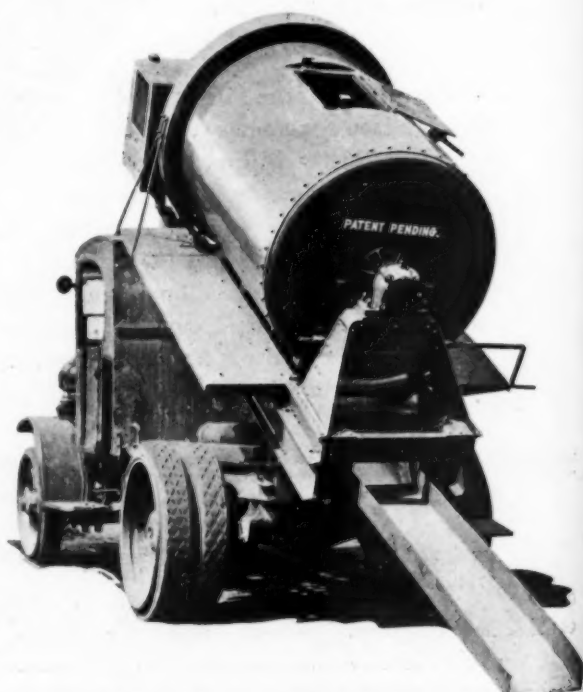
Trailers and semi-trailers can be arranged to meet a wide range of transportation requirements. For heavy loads dual wheels can be used on a semi-trailer unit and the rear of the truck. When time consumed in loading and unloading is an important factor, two or more trailers or semi-trailers can be used in the operation of each truck and, while one unit is being loaded, the truck can proceed with another. This one chassis, with the extra equipment to meet the requirement of the occasion, can perform the work of two or three trucks.

In some fleets different kinds of trailer units are used with the same truck chassis. For instance, one company uses a detachable tank semi-trailer and a stake-body trailer alternately with a single power unit.

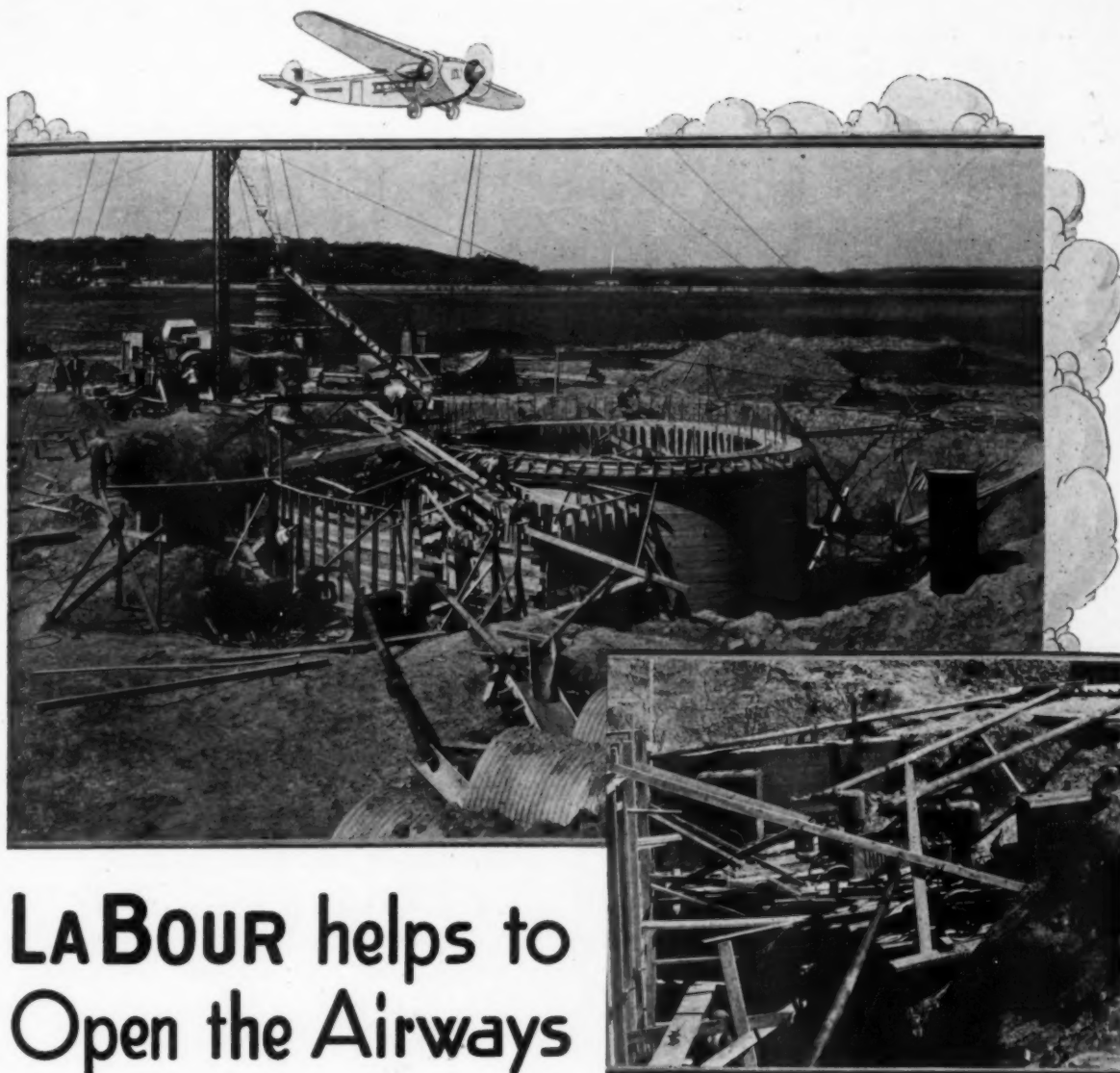
A Ready-Mixed Concrete Carrier

THE Biehl ready-mixed concrete conveyor, which is designed for carrying ready-mixed concrete from a central mixing plant to the job, is manufactured by the Biehl Iron Works, Inc., Reading, Pa. This conveyor is a cylindrical tank which may be mounted on any suitable make of truck.

All Biehl conveyors, which keep the concrete agitated by a rolling motion, are powered by a separate motor, which can be operated at a uniform speed, besides having a governor control which allows running the motor at the best suitable speed according to the length of the haul.



The Biehl Ready-Mixed Concrete Carrier



LABOUR helps to Open the Airways

Lying adjacent to the Ohio River, although protected from floods by a levee, Lunken Airport, Cincinnati's municipal landing field, is subject to saturation with water which arises from beneath the surface of the ground. To overcome this hazard to aircraft, E. A. Ernst & Sons Company, Milford, Ohio, are building a pumping plant to dewater the field.

Obviously, this construction could not progress in the face of constant seepage. LaBour Self-Priming Centrifugal Pumps, however, solve the problem completely for the contractor by handling this seepage water—muddy, sandy water—when and as it is present.

Located as high as 20 feet above the water supply, these LaBour Pumps actually prime themselves at all times—no internal floats, no priming pumps or attachments being needed—and keep

the working area constantly dry. No other centrifugal can provide such service with so little maintenance. The impeller is the only moving part—only an occasional oiling being required. There are no valves of any kind needed.

LaBour Pumps for contractors are available in a wide range of capacities, in either portable or stationary installations. Bulletin 33 fully describes them, and will be mailed to you promptly—without obligation, of course.

Write for Bulletin 33

The LABOUR COMPANY, Inc.
ELKHART, INDIANA

LA BOUR PUMPS

NEVER LAY DOWN ON THE JOB

Do you mention THE AMERICAN CITY? Please do.

New Fractional Horsepower Gas Engine

A NEW fractional horsepower gasoline engine, known as the Cushman Husky, designed for general purpose service and suitable for driving power lawn mowers, small compressors, pumps, electric lighting sets and similar uses, has recently been placed on the market by the Cushman Motor Works, Lincoln, Neb.

In addition to being equipped with Timken bearings on the crankshaft, this engine possesses several other novel features in design and construction. The engine is of the single-cylinder, 4-cycle air-cooled type, rated at $\frac{3}{4}$ -horsepower at 1,750 rpm, with a total speed range of 1,200 to 2,000 rpm. The base is $6\frac{3}{4} \times 11$ inches and the overall height of the engine is $15\frac{1}{2}$ inches, the complete weight being only 55 pounds.



The New Timken-Equipped $\frac{3}{4}$ -Horsepower Cushman Husky

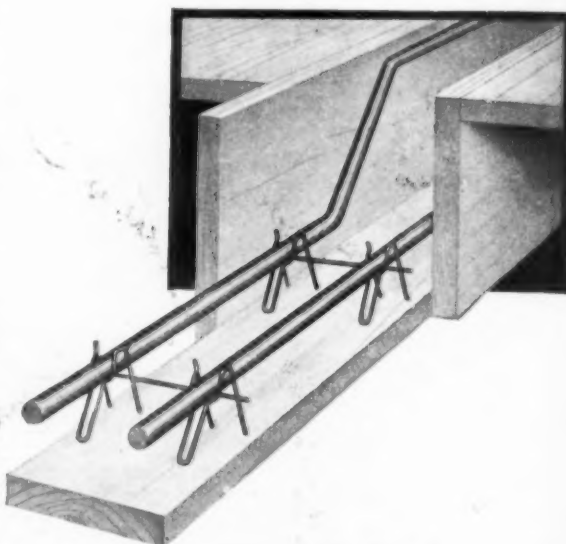
The engine body consists of three parts, the cylinder block, the crankcase and the base, which has been made removable so that the engine can, if necessary, be mounted without it. The cylinder has a removable head which facilitates inspection and maintenance. One of the features of the engine is the cooling system. Both the cylinder block and head are equipped with numerous and heavy cooling

vanes, cast integral. A housing is provided which fits over the flywheel on one side of the cylinder. As a result of this arrangement, a forced draft is created through the cooling vanes which materially accelerates the rate of heat dissipation. The ignition system consists of a weatherproof Wico high-tension magneto driven from the crankshaft. Normally the engines are equipped with a foot lever starter, but either handle or rope starters may be furnished.

A Versatile Tractor in a New Size

A LLIS-CHALMERS Monarch tractors built by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., have been built in the 75 and 50 sizes and are now being made in the 35 size, the general design, construction and appearance of which is similar to the larger machines. All of the basic principles of track construction and clutch steering are incorporated in this new and smaller unit. The engine is of standard Allis-Chalmers design and construction built with generous size for every load requirement. Its removable cylinder liners are of nickel iron which is very resistant to wear, but their replacement is possible in a very short time and at a minimum of expense when necessary. The engine is provided with a full pressure lubricating system and an oil Purolator. The track is of extra length providing an even distribution of weight which is essential when working in heavy soil conditions. The general dimensions of the Allis-Chalmers 35, Model K, are 10 feet 9 inches length overall, including the starting crank, 5 feet 6 inches width overall, 5 feet 6 inches height to top of radiator, 67 inches length of ground contact from center to

center of track sprockets and 14 inches ground clearance. The tractor has three speeds forward, 1.84, 2.75 and 4.00 miles per hour and a speed of 2.12 miles in reverse.



The New Union Joist Bar Spacer

Helpful Products for Building Contractors

SEVERAL new building specialties have recently been developed by the Union Steel Products Co., Albion, Mich., including the expansible reed clip, the snap-in joist bar spacer and the continuous sleeper spacing anchor.

The expansible reed clip, which is very easy to apply, is made in two sizes to take care of every width of flange and holds the material 1 inch away from the flange. The new clip has a gripping action at the edge of the flanges so that it holds in place firmly. It has a continuous feature so that



The Expansible Beam Wrapping Reed Clip. Inset Shows Simple Expanding Operation

Two Ransome 56-S STANDARD BUILDING MIXERS



SPEED up the new
Mississippi River Lock
at Minneapolis - - -
64,000 cu. yds. to be
poured in 8 months.

Work is progressing rapidly on the new lock on the Mississippi River which will extend navigation up to the docks of Minneapolis, Minn. The Northern States Contracting Company is shown here using two Ransome 56-S Mixers in building the lock, which will be 500 ft. long and 56 ft. in height.

The work is to be completed in 8 months, and there will be 64,000 cubic yards of concrete in the walls.

The concrete mixing plant, located on the river bank, consists of two 250-ton steel bins and underneath each bin is a 56-S Ransome Standard Building Mixer. Bulk cement, stored in a wood bin projecting above the mixing plant, is being used.

RANSOME BIG MIXERS FOR BIG CONSTRUCTION JOB.

Bulletin No. 122 tells about Ransome Big Mixers.

Ransome Concrete Machinery Company

1850 - Service for 80 Years - 1930

Dunellen

New Jersey

4 feet of the clips can be placed at a time. The new design gives more reinforcing per linear foot of flange, especially on the wider flanges. There are two longitudinal wires on both sides. As the clip is expanded to fit wider flanges, it shortens in length and provides more reinforcement per linear foot. The two sizes wrap all flanges from 3 inches to 18 inches wide, thus the contractor does not have to look for the proper size for each place in the building.

The snap-in joist bar spacer is easy to operate, it being necessary only to place the bar between the supporting spacing wires and step on it. The bar snaps into place and is rigidly held there. The bars are accurately spaced from the sides and from the bottom and they cannot get out of place.

The snap-in spacer has three supports directly under each bar and it is practically impossible to crush or sag, even if one walks or jumps on the reinforcing bars. The spacer cannot fall down in a crack between the bottom form boards and the vertical side forms, but is supported directly under the bars and the horizontal wire prevents the bars from getting any closer than $\frac{1}{2}$ -inch from the side walls.

The continuous sleeper spacing anchor is made with wire anchors welded along a spacing wire which automatically spaces the sleepers on the usual 12 or 16-inch centers. These strips are made in 4-foot lengths with four anchors welded along its length when the spacing is 16 and five anchors welded along the length when the spacing is 12 inches. The 4-foot strips are placed almost as easily as a single anchor can be placed and can be set very accurately without the use of templates or measures.



A Turn-O-Matic Cement Box in Use on an International Truck

An Automatic Dump Box for Cement Handling

THE Turn-O-Matic cement box, of all-steel construction, are welded and riveted, and built to withstand hard knocks, is manufactured by the George O. Harm Co., Warren, Ohio. This box is of simple construction, consisting of a cement container revolving in a steel frame which is attached to the truck by means of adjustable clamps. The lid is attached to the frame in such a manner that when the lid is closed it holds the container in an upright position, but when the lid is lifted the box turns over, discharging all of the cement. The box is 59½ inches long, the lid is 13½ inches wide and the capacity 8 cubic feet.

Cement may be placed in these boxes at the batching plant either from a bulk handling plant or dumped from sacks. In transit the cement is protected from rain or from dampness in the aggregate. When the trucks arrive at the paver the batches are immediately available. The batch is released, and a large portion of the aggregate enters the skip before the box deposits the cement on top of the moving stream of material. A protective layer of sand and stone is thus formed in the skip which prevents the cement from caking on the wet metal

surface. The truck body is also kept clean and smooth, for the cement rides out of the truck on top of the aggregate.



A Shaw True-Cut Scraper in Digging and Filling Position

A Two-Wheel Heavy Duty Scraper

A SCRAPER which can be used on virgin soil such as sand, dirt, stone or sod without the need of preliminary plowing has been developed by the Shaw Excavator & Tools Co., Worthington, Ohio, and is sold under the name of the Shaw True-Cut scraper. The scraper loads, transports, dumps and spreads all under the supervision of the driver of the tractor. A winch connected to the tractor with control to the driving seat of the tractor raises the bucket to the carrying position and at the dumping destination hoists it to position and, as the contents slide out, they are spread automatically by continuing in the forward draft.

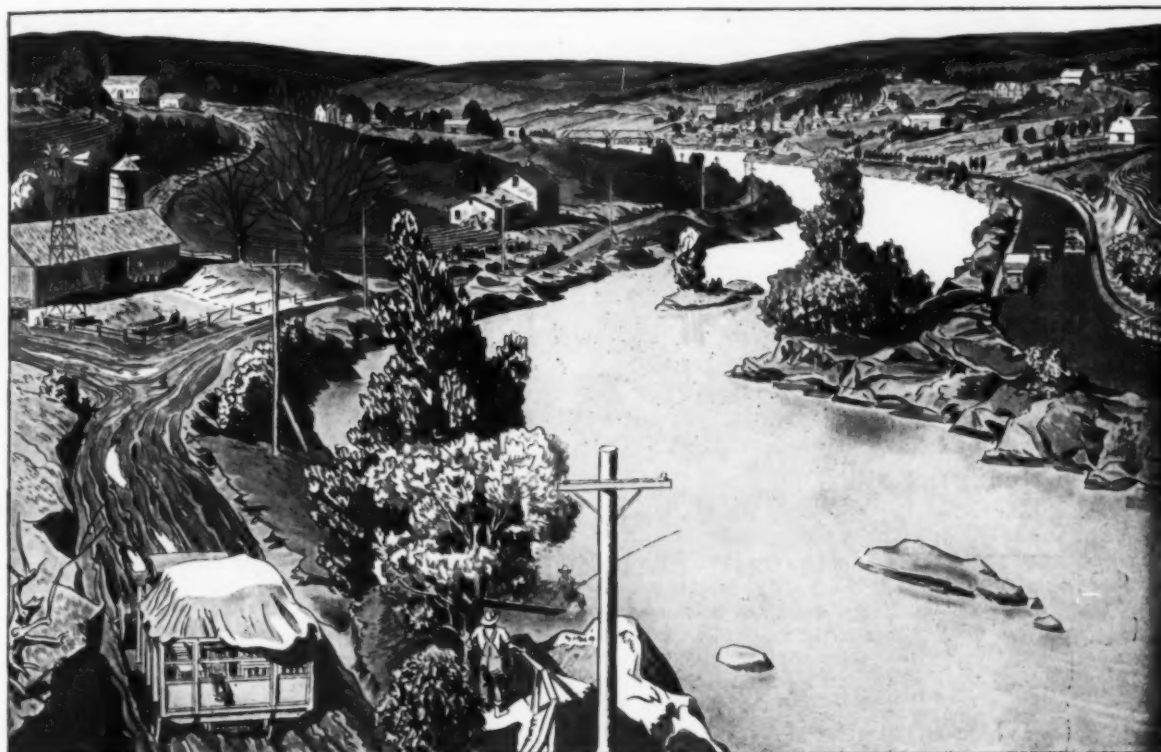
The Shaw True-Cut scraper is staunchly designed and constructed entirely of steel. It is two-wheeled, thus making its turning radius short. There are no gears, sprockets, rope connections or small moving parts to foul and break readily. The cutting edge is detachable, adjustable and reversible and consists of a blade of hard tempered high carbon steel.

The scraper is built in three sizes, size 20 which carries level full 1½ yards, size 30 which carries level full 2¼ yards and size 60 which carries level full 4 yards. Each size will actually carry a larger load when rounded up according to the statement of the manufacturer. The 60 carries 4¾ yards when rounded, taken from a cut 8 inches deep by 5½ feet wide by 34 feet long. Tests of these scrapers under none too favorable conditions show that one man with a True-Cut Sixty attached to a crawler type tractor can excavate, move and grade over a haul up to 2,000 feet at a remarkably low cost and can handle 500 cubic yards of dirt 400 feet in a 10-hour day at a cost of less than 5 cents per yard including \$10 per day for depreciation and repair.



A Kenrick Seminary Building Under Construction in St. Louis, Mo. The Photo Shows a Jaeger Trough-Type Mortar Mixer in Use by Fred Danes & Son, the Contractors for the Job

Take the Far out of Farming



Seventy-four per cent of the nation's 6,300,000 farms lie on plain old-fashioned mud'n' dirt roads—roads that look more like the year 1830 than 1930. Many farms fifteen miles from market over smooth, all-year highways are more accessible than others only four miles away on unimproved—and often impassable—roads.

Put a fair proportion of road funds into Tarvia construction and maintenance and you have a practical solution of the farm-to-market road problem. A Tarvia program enables any community to have easy-riding, traffic-safe, storm-proof highways—quickly and without excessive taxation. With Tarvia, any road can be developed through progressive stages, keeping it at all times suitable to the load it must carry.

The Tarvia field man will gladly give you the details. Phone, wire or write our nearest office.

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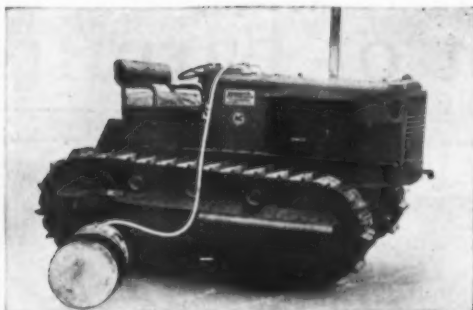
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Tarvia

GOOD ROADS
AT LOW COST

Please mention the CONTRACTORS AND ENGINEERS MONTHLY—it helps.



A Tractor Equipped with the Simplex Filler

An Automatic Fuel-Tank Filler

THE Simplex fuel-tank filler, an automatic device for filling the gasoline tank of a tractor, shovel or any other piece of equipment in the field from the customary drum or tank wagon, is manufactured by the Simplex Fuel-Tank Filler Co., 651 Brannan St., San Francisco, Calif. This filler operates on the vacuum principle, the vacuum produced by the suction from the intake manifold of the motor being employed to draw the fuel into the gasoline tank through a length of hose attached to the filler head.



A Simplex Fuel-Tank Filler

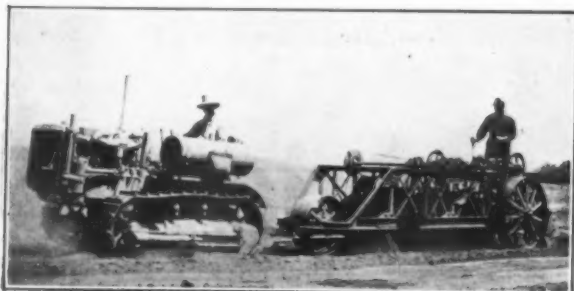
The filler head is a brass casting which screws into the gas filler tank opening and is connected to the intake manifold of the motor through a small copper tubing in which a needle valve is placed to start or stop the filling operation. The filler head is also supplied with a check valve which is actuated by a cork float which rises when the gasoline reaches the top of the tank, closing the check valve and shutting off the flow of gas

automatically, thus preventing an overflow of the tank.

In operating, provision must be made to supply the motor with fuel from an auxiliary tank while the main tank is being filled. The capacity of the Simplex filler is 10 to 12 gallons per minute and it will operate on any lift up to 14 feet.

A 3-Wheel Wagon Grader

DESIGNED for an extremely short turning radius, the Ball wagon grader made by the Blaw-Knox Co., Pittsburgh, Pa., can be turned with the tractor in a 16-foot roadway. When two graders are used in train, the turning radius is increased to only 20 feet. The Ball wagon grader consists of two digging buckets of 40-cubic foot capacity each with a spread blade carried at the rear which carries from



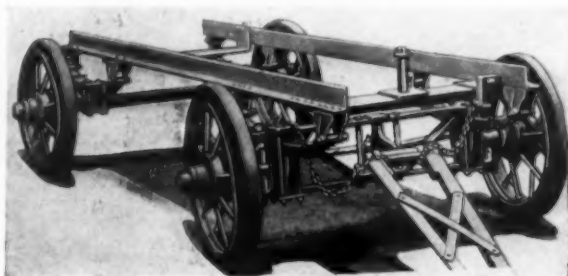
Picking Up a Load with a Ball Wagon Grader

9 to 14 cubic feet of additional dirt and is of great value when spreading.

The digging buckets are equipped with a protective apron which retains and packs in all the material insuring a full load. The grader scoops its load without any previous plowing or subsoiling, except in extremely hard soil.

The manufacturer states that 8, 10, 12 and 14-cent dirt moving costs are not at all unusual and numerous jobs can be cited where these costs have been obtained on street construction, roads, dams, airports, cuts, fills and leveling.

One man handles the unit and is able to control the cutting depth and load the buckets to heaping capacity. For connection to the tractor a swivel coupling of special alloy steel eliminates strain on the draft bolt and makes a flexible connection through the drawbar which gives a straight line pull to the grader at the same elevation as the take-off on the tractor. The front wheel is set in a greaseless ball-bearing turntable for quick and easy turning with minimum power.



The New EWC High Speed Machinery Trailer

High Speed Machinery Trailers

A RECENT addition has been made to the line of EWC trailers manufactured by the Electric Wheel Co., Quincy, Ill. This new high speed machinery trailer is especially designed for the mounting of air compressors, pumping outfits and similar portable equipment, as the permanent steel frame arrangement permits the ready mounting of the equipment by setting it directly into the trailer frame.

The trailer equipment includes auto type front axle for short turning, springs, Alemite lubrication fittings, spring equipped drawbar and Electric steel wheels with solid rubber tires. The trailers are made in several capacities to accommodate various size machines and equipment.

A Rod for Arc Welding

A NEW welding rod has been developed by the Fusion Welding Corp., 103rd St. and Torrence Ave., Chicago, Ill., for carbon arc welding. This rod, known as Weldite C-No. 6 Fluxed is particularly adaptable for the welding of mild steel plates and castings. The welding speed has been substantially increased and the deposit is strong and ductile, being more readily machinable than deposits made with the usual filler rod used with the carbon arc process.

The ease of manipulating the arc due to the influence of the flux coating which causes the arc to pull from the hottest part of the weld puddle rather than jumping to the colder edges, as is usually the case with the carbon arc process, has enabled operators to attain welding speeds considerably higher than is possible with the bare filler rod. Heavy section welding of mild steel furnishes a very favorable application for this rod as weld deposits are sound and strong. The ductile qualities of the deposit make it extremely efficient in foundry work.

The Story Behind Our Concrete Highways

*.....reveals some vital
facts about the modern
way to cure concrete...*



THE road building of today shows a big advance over the road building of even a few years ago. In curing methods especially, the difference is marked.

Cumbersome and costly cover methods are being replaced by the use of Calcium Chloride. The big gang needed to handle cover material is being replaced by one man with a spreader. The uncertainties of sprinkling and constant inspection are being replaced by the sure work of natural moisture from the atmosphere.

Whether spread on the surface or used as

an admixture, Calcium Chloride accelerates the set of concrete and gives it greater-than-normal early strength. Both methods are approved by the United States Bureau of Public Roads.

Write today to one of the member companies for full information about these time-saving, money-saving methods. Ask for booklet 442

CALCIUM CHLORIDE PUBLICITY COMMITTEE

THE COLUMBIA PRODUCTS COMPANY, Barberton, Ohio
THE DOW CHEMICAL COMPANY, Midland, Michigan
SOLVAY SALES CORPORATION, 40 Rector Street, New York

CALCIUM CHLORIDE

CURES CONCRETE

The Elevating Grader As a Dirt Mover

ELEVATING graders are constantly gaining in favor as earth movers. The Caterpillar elevating grader which has been made more practical by a direct power take-off from the motor on the tractor pulling it, thus eliminating an auxiliary motor or bull wheel, is made by the Caterpillar Tractor Co., San Leandro, Calif.

Where large quantities of earth must be moved from the borrow pit to a fill such as on a Mississippi levee project, a well-organized wagon haul keeps the grader constantly at production, giving action without lost time and earth is constantly on the move from the time it is rolled up by the plow until it is dumped by the wagons at the fill. In direct casting in from a ditch to the road bed, the earth is handled but once, cutting time and costs.

The Caterpillar Sixty elevating grader has no bull wheel mechanism to reduce the tractor's drawbar power nor is it dependent upon favorable ground conditions for big capacities. This gives lighter draft in this grader and full tractor power delivered to the carrier. Power is transmitted to the carrier directly from the power shaft of the tractor by two universal knuckles, one mounted over the drawbar of the tractor and the other centered in the grader frame exactly over the king bolt. Power is transmitted through a telescoping connection to the main grader drive shaft giving great flexibility on uneven ground. This main grader shaft revolves in self-aligning ball bearings and applies power directly to the countershaft sprocket by a steel roller chain.

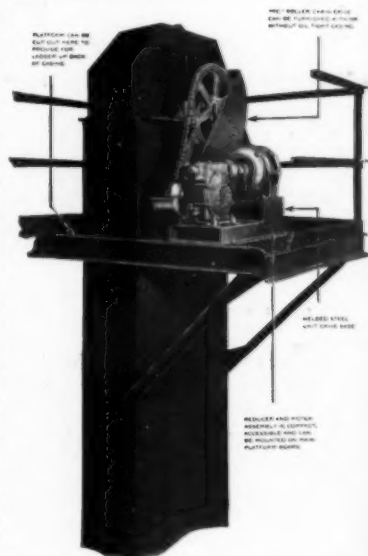
The countershaft sprockets are integral and the shaft is mounted on tapered roller bearings. The countershaft sprocket drives the upper drum to the carrier belt by a steel roller chain with removable links. The upper drum and carrier roller are mounted on bronze bushings. The carrier is all steel with high sideboards and the carrier frame sides form an apron which sheds earth and keeps it from falling upon the returning belt. An automatic pan cleaner consisting of an endless link chain with scraper keeps it in motion over the pan. A worm and gear which tightens the belt and a rack and pinion which forces the hinge up and down are operated by a single hand wheel with a simple shift arrangement. The plow is bolted to a heavy ship-channel beam with a quick raising and lowering adjustment both front and rear which operate by handwheels with automatic stop latches. A 28-inch rigid disc plow is standard equipment, but either a rotary plow or moldboard may be substituted. The rotary disc is preferred for sticky or loose soil and the moldboard in stony rock ground.

The frame of the Sixty elevating grader is constructed from heavy 8 and 10-inch channels braced, counterbraced and gusseted. It is put together with hot driven rivets. The heavy

reinforcing cross members form an opening for the truss arch which moves the carrier.

A New Standardized Elevator Drive

A NEW elevator drive for bucket elevators of the centrifugal discharge, perfect discharge or continuous bucket types which require from 3 to 15 horsepower has been developed by the H. W. Caldwell & Son Co., a division of the Link-Belt Co., Chicago, Ill. The first reduction of this Caldwell elevator drive is made up of a ruggedly built fully enclosed worm gear speed reducer to which a motor is coupled. The motor and worm reducer are aligned on a welded steel base, making a compact assembly easily supported on the elevator casing or platform.



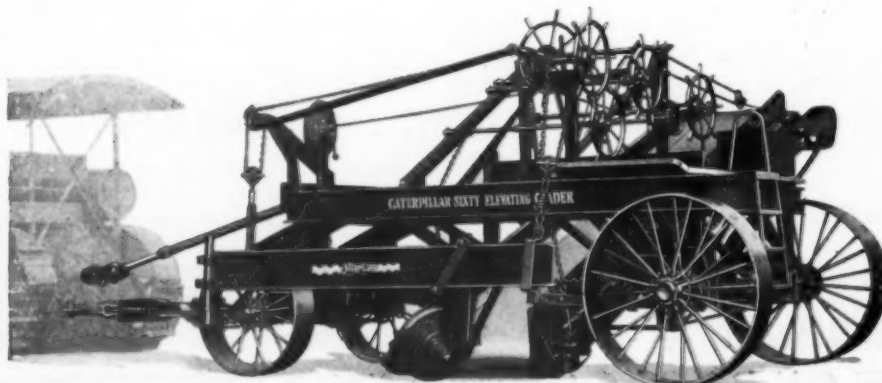
The Caldwell Elevator Drive Applied to a Vertical Centrifugal Discharge Bucket Elevator

The worm gear reducer unit has a hardened and ground steel worm, while the worm gear is of a special bronze, and both are enclosed in a housing. This enclosed high speed reduction unit is direct-connected to the motor through a flexible coupling. All bearings are of the anti-friction type, with automatic splash lubrication for all moving parts.

The welded base is made to fit the installation. Some bases are furnished with extensions at the motor end to span the full width of the casing, so as to be mounted on the projecting platform beams while others are mounted directly on such platform, walkway or support as may be available.

The second reduction gear is made by a Link-Belt RC roller chain, engaging with cut steel pinion on the worm gear shaft and with cut cast iron sprocket on the elevator head shaft. It also acts as a flexible connection between reducer shaft and head shaft. Reasonable speed changes in the elevator head shaft can readily be made by changing the size of one or both of the sprocket wheels.

The Caldwell drive units are divided into two groups, the 3 and 5-horsepower series, using a No. 1 reducer and the 7½, 10 and 15-horsepower series, a No. 2 reducer. Each group of drives is further divided into two series, one for the slow moving continuous and perfect discharge elevators, with head shaft speeds of 15 to 23 rpm. and the other series of drives for centrifugal discharge elevators having head shaft speeds of 35 to 43 rpm.



A Sixty Elevating Grader for Dirt Moving

Twenty Years in Service Still "Almost Perfect"

GAINESBORO TELEPHONE COMPANY
INCORPORATED
211 BROADWAY

COOKEVILLE, TENNESSEE

October 18, 1929.

JAMES H. COX
PRESIDENT AND GENERAL MANAGER

Newport Culvert Company,
Newport, Kentucky.

Gentlemen:

In 1909, 1910 and 1911, as Secretary and Purchasing Agent of the General Road Commission of Putnam County, Kentucky, our culverts from the Newport Culvert Company of Newport, Kentucky, and at that time same was known as the Gemine Open Hearth Iron, guaranteed to last indefinitely, and after twenty years of use, I have today in company with others, examined some of these culverts that are still in use and found same to be almost in perfect condition. A section of one of the culverts was removed in my presence and upon inspection it is free from rust and seemingly good for years and years to come.

In 1916, seven years after the work had been done, I was in company with some parties who made an examination at that time and testified to their condition, and at this date, twenty years after they were installed, I find the same culverts examined at that time in use and seemingly in as good condition as they were upon that date.

A commercial photographer is today photographing a 30 inch culvert on the old Spring Creek road known as the Harve Terry Road, and this is one of the culverts that I referred to above as being in almost perfect condition and seemingly with no deterioration after twenty years of use.

Yours truly,

James H. Cox



Above—GOHI Corrugated Culvert installed in Putnam County, Tenn., in 1909. The almost perfect condition of this culvert, after twenty years in the ground, indicates a certainty of service of several times twenty years.



(Meet all copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

© 1930, G. C. M., Inc.

Corrugated Culverts

Made of Genuine Open Hearth Iron which is guaranteed 99.90% pure iron-copper alloy. Long service has proved the extreme resistance of this iron to corrosion, abrasion, freezing water, set-

ling earth, and heavy traffic. GOHI Corrugated Culverts are easy to handle. Quickly installed. No repairs. No upkeep. Specify "GOHI" for lowest-cost-per-year drainage.

GOHI CULVERT MANUFACTURERS, Inc.
Newport, Ky.

Lincoln Steel and Forge Co.
St. Louis, Mo.

The Newport Culvert Co.
Newport, Ky.

The Pennsylvania Culvert Co.
Philadelphia, Pa.

Denver Steel & Iron Works Co.
Denver, Colo.

A. N. Eaton, Metal Products
Omaha, Nebr.

Feenaughty Machinery Co.
Portland, Oregon

Tennison Brothers
Texarkana, Ark.

Capital City Culvert Co.
Madison, Wis.

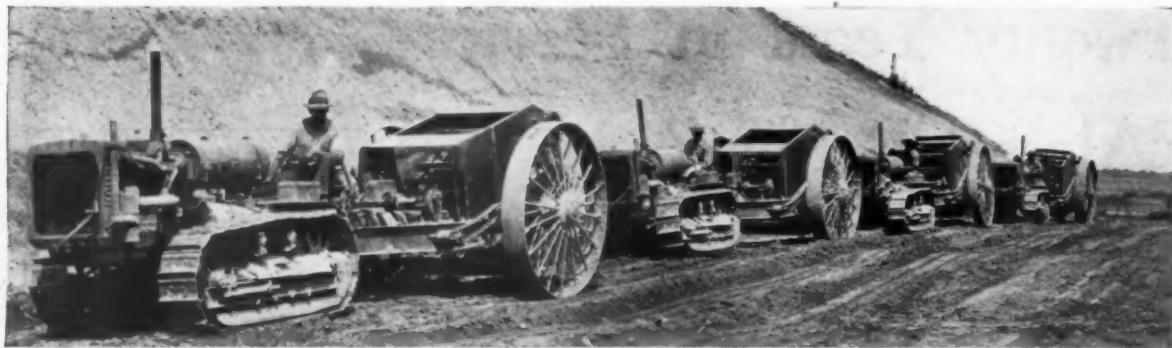
Central Culvert Co.
Ottumwa, Iowa

Roanoke Sales Corp.
Roanoke, Va.

St. Paul Corrugating Co.
St. Paul, Minn.

Tennison Brothers
Oklahoma City, Okla.

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



Four Highway Scrapers on a Grading Job in Wisconsin

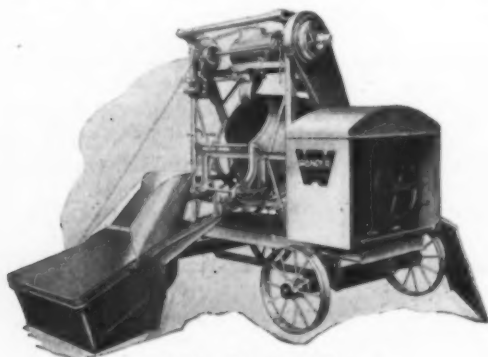
A One-Man Tractor-Drawn Self-Loading Scraper

QUICK action self-loading scrapers made in 2, $3\frac{1}{2}$ and $5\frac{1}{2}$ -cubic yard capacities are made by the Highway Trailer Co., Edgerton, Wis. The middle size scraper, which handles a load of $3\frac{1}{2}$ cubic yards, weighs approximately 7,000 pounds and has wheels 6 feet in diameter with 10-inch treads. The scraper is operated entirely by the tractor driver through a power take-off from the tractor. The load picked up can be wheeled any desired distance without spilling and the entire outfit can be turned in a 24-foot circle. A $3\frac{1}{2}$ -cubic yard scraper will replace approximately 6 teams and 9 to 10 men, as it is unnecessary to root the soil before starting operations and the scraper picks up its load in about 50 seconds.

On a difficult grading job on State Highway 104 between Hustisford and Woodland, Wis., four Highway scrapers were used with a total working time of 256 hours. The average hauling distance was 715 feet and the yardage removed included 19,755 cubic yards of earth, 1,073 cubic yards of loose rock and 948 cubic yards of rock fence.

A Side Loading Mixer With a Non-Clogging Charging Skip

AN automatic skip bumper in connection with the streamline charging skip is one of the features of the new Wonder 5-S and 7-S mixers, made by the Construction Machinery Co., Waterloo, Iowa. The mixer as illustrated is built with either steel wheels or disc rubber-tired wheels both on roller bearings. This Wonder mixer is a single-opening tilting mixer and is used extensively in pouring a culvert or bridge, building, foundation or sidewalk, in fact, any one of



The New Wonder Mixer

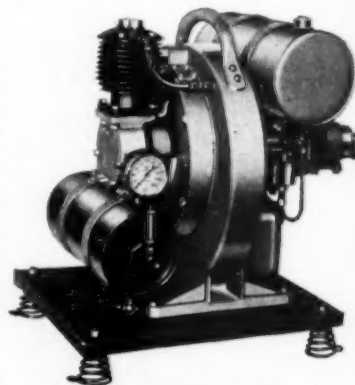
the hundred one-bag jobs which a contractor faces continuously. Steel is used wherever practical for durability and every gear and chain is fully enclosed for safety. Grooved spools on which to wind the cable are another feature.

The mixer is equipped with an accurate and fast water measuring tank which is free from three-way valves and other complicated mechanisms. The power plant may be either gasoline or electric.

A Portable Air-Compressor

A PORTABLE air compressor that has only six moving parts, is ball-bearing throughout and which can operate a pneumatic hammer, drills for brick or concrete work, stone engraving tools, spray painting outfits for spraying trees and general garage work, has been developed by the Homelite Corp., Port Chester, N. Y.

The compressor is powered with a built-in Homelite $1\frac{1}{2}$ -horsepower air-cooled gasoline engine and weighs only 85 pounds. The compressor works under pressures up to 150 pounds and delivers 6 cubic feet of air per minute. The engine is equipped with a Bosch water-proof magneto, gravity feed from the small gasoline tank and a float type carburetor.



The New Homelite Portable Air Compressor

Truck With Bevel Gear Driving Axle

WITH 8 speeds forward and 2 reverse, the Freeman four wheel drive truck, made by the Freeman Motor Co., Detroit, Mich., has a speed to suit every hauling condition. It has gear ratios of $8\frac{1}{2}$ to 1 in high and 155 to 1 in low. Power is transmitted to the front and rear axles through a transfer case securing an even distribution of power front and rear, thereby reducing gear wear and increasing the tire mileage.

For these four-wheel drive trucks a new type of drive has been developed, being a bevel design front-steer drive running in oil in weatherproof housings, permitting greatest ease in steering. They are made in 2 to $3\frac{1}{2}$, 5 and $7\frac{1}{2}$ -ton dump and freighter chassis sizes.



LEADERSHIP

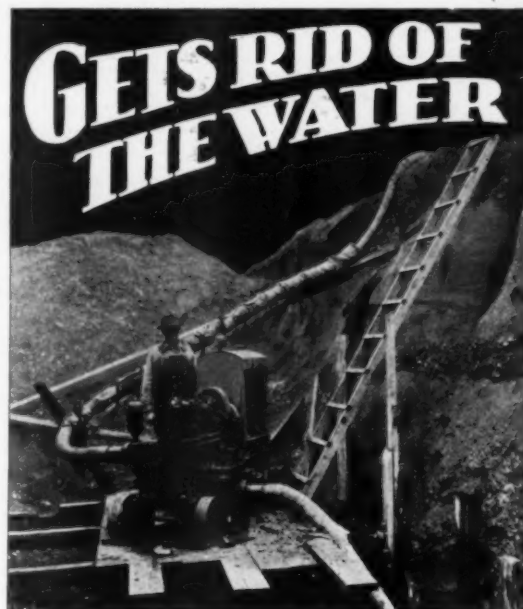
Ability to lead means having those qualities that men recognize as superior. *Nothing else* makes leadership.

From coast to coast, wherever new roads are being made or present ones repaired, Buffalo-Springfield Road Rollers are the choice of the men on the job. Advanced design and superior performance make these rollers widely accepted as leaders worthy of the name.

Various steam and motor-driven designs in all practical sizes. Attachments when desired. Interesting booklet on request.

The
Buffalo-Springfield
Roller Co.
Springfield, Ohio

BUFFALO- SPRINGFIELD ROAD ROLLERS



Pumping stops only when the job is done if a BARNES is on the job. Continuous operation, day and night, for weeks at a time, is common.

Barnes Plunger Trench Pumps handle mud just as well as a diaphragm pump, and have no diaphragms to wear out. You can spill the water at the pump or force it under any head up to 50 feet—maximum total head 75 feet. Capacities up to 15,000 gallons per hour.

Before you buy a pump get the facts about a Barnes—plunger, diaphragm, or centrifugal. Use the coupon.

THE BARNES MANUFACTURING CO.
Mansfield, Ohio

*You can always
depend on Barnes*



**BARNES PLUNGER
TRENCH PUMP**

BARNES DRAINAGE PUMPS

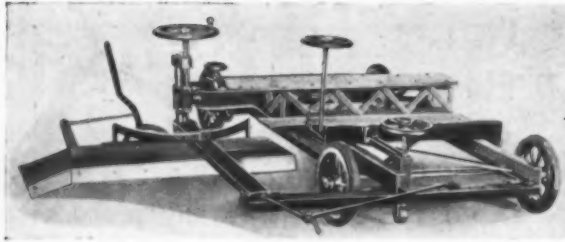
The Barnes Manufacturing Co., Mansfield, Ohio.

Send complete information on Barnes Drainage Pumps.

Name

Street

City State



The Improved Moritz-Bennett Shoulder Finishing Machine

An Improved Shoulder Machine

THE improved Moritz shoulder machine, made by the Moritz-Bennett Corp., Effingham, Ill., is heavier and faster and the improvements in the controls give greater ease of operation. All four wheels ride on the pavement, thereby preventing the possibility of wavy shoulders and eliminating the need of string lines or levels.

The improved control for elevation of the main blade with a larger hand wheel, Acme thread screw, roller bearing and compression spring make for easier operation and positive adjustment. There is a new circle control of the horizontal angle of the main blade with a swing of 90 degrees, a new positive adjustment for pitch of the main blade, giving a range of 1 to 4 up or down, a new adjustment to permit tilting of the main blade at various cutting angles, a conveniently-located foot brake, larger and stiffer boom and a new fifth wheel arrangement allowing the machine to be turned in its own length.

The location of the improved steering arrangement gives the operator an unobstructed view of the blade and pavement edge and the redesigned frame is strong and sturdy. A platform has been added on the rear of the mould board for convenient operation of all blade adjustments.

A 10-inch cable hitch is furnished with the machine, as well as 32 x 4-inch solid rubber tires, wheels equipped with Timken roller bearings and substantial drawbars forged from heavy tubing.

A New Compact Power Unit

A NEW compact, light weight power unit, known as the Model H-199 and particularly adaptable to a large variety of industrial installations, has recently been developed by the Buda Co., Harvey, Ill. The overall dimensions of the unit are approximately 21 inches wide, 39 inches high and 44 inches in length, while its power development ranges from 16 horsepower at 800 rpm to 45 horsepower at 2,000 rpm.

The engine is a $3\frac{3}{4} \times 4\frac{1}{2}$, 4-cylinder type, with a piston displacement of 199 cubic inches. The crankshaft is 3 inches in diameter on five main bearings and the shaft is short and close coupled. The lubricating feature of this engine is a constant supply of oil at high velocity and uniform pressure. The cooling is effected by a large capacity water pump which passes a large volume of water at high velocity through the engine at all times. The water pump is equipped with stainless steel shaft and leak-proof bearing.

The main bearings are the half-shell, babbitt-lined shimless type. The connecting rods are babbitt-lined directly to the steel forgings. The valve tappet cluster is made in two groups and designed for quick accessibility in service. The crankcase and cylinders are of chrome nickel alloy iron. Provision is made for the use of a fuel pump, oil filter and electric start-

ing equipment when desired. The air cleaner is built as part of the engine.

A large capacity radiator is supported on a casting which also carries the front end of the engine. The fan is of 18-inch diameter with 4 blades and is driven from the crankshaft by a V belt. The engine has a pedestal bell housing, making it possible to support the unit either with or without the channel frame. A 12-gallon gasoline tank is provided in the hood of the unit which permits gravity flow of the fuel to the carburetor. A close regulating governor is supplied, completely enclosed and operated directly on the butterfly valve on the carburetor.

A Gear Operated Bulldozer

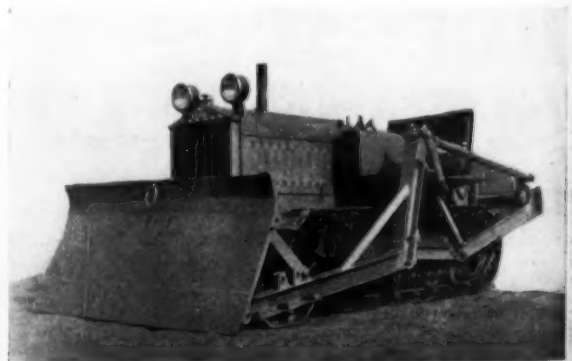
A BULLDOZER for mounting on Cletrac tractors and which is gear operated, has been produced by Niess & Co., Inc., 1613 Polk St., Minneapolis, Minn. This bulldozer, known as The Bully, has a power transmission unit composed of a pinion and bevel gear, together with spur pinion and gear segments employed in connection with a Twin Disc clutch and brake. The gears are enclosed in an oil-tight housing attached to the transmission case of the tractor with the clutch and brake mounted on the outside of the gear case to be readily accessible.

A number of advantages are claimed by the manufacturer for the gear-operation as it makes for speed. The travel radius of the blade on all sizes of tractors is wide, giving high lift with additional clearance for free travel, a particular advantage when traveling over rough ground. With the removal of two pins set into the slide of the lifting arm, the blade is allowed an additional rise nearly equal to the lift without putting a strain on any part of the tractor. The blade can be dropped below the level of the track and can be adjusted by means of a stop provided for that purpose.

The control of the blade is by a single lever. The blade can be locked to the ground or allowed to float. The lifting of the blade is practically automatic as the clutch becomes disengaged when the limit of lift is reached. The blade can be raised while under load and held in any position above the ground.

The drawbar of the tractor is in the clear, permitting the use of any other equipment. The installation of the transmission unit in no way interferes with the use of the tractor. Once installed the bulldozer can be allowed to remain permanently.

The Bully is made in two types, the bulldozer with a rigid blade and the backfiller with an adjustable blade. The adjustable type blade is set very close to the front of the tractor being supported and propelled at both ends instead of at the center. This construction eliminates practically all side draft. With the blade set in a straight line, it is as close to the tractor as the rigid blade. This bulldozer is designed to be attached to Cletrac Models 20, 30, 40 and 80-60.



The New "Bully" Bulldozer for the Cletrac

Schaefer
 CLEVELAND

One-Man Automatic Tractor Scraper

Schaefer
 CLEVELAND

SCHAEFER
Scrapers are fur-
nished in 4-, 5-, 6-
and 7-foot widths.
It will pay you to in-
vestigate.



It loads and
dumps, spreads
and levels—all op-
erations being con-
trolled from the trac-
tor driver's seat.

Write for our circulars

The Gustav Schaefer Company

4180 LORAIN AVE.

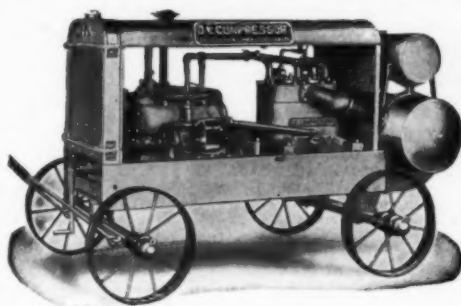
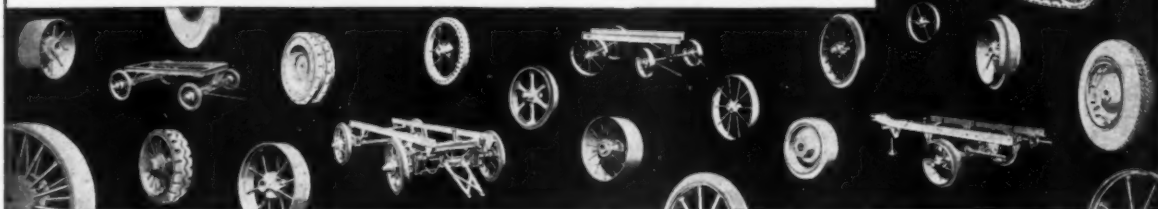
CLEVELAND, OHIO

COMPLETE MOUNTING EQUIPMENT FOR EVERYTHING PORTABLE

TRUCKS, TRAILERS, WHEELS, AXLES, CRAWLER
TREADS, BEARINGS, ENGINEERED TO REQUIREMENT

ASK FOR CATALOGS

ELECTRIC WHEEL CO. DEPT. C M QUINCY, ILL.



O — THE PORTABLE — K COMPRESSOR

The O-K Portable Compressor has been tested and approved by hundreds of contractors all over the country. Lower operating cost, dependability, ruggedness and continuous operation are just a few of the merits that you should consider before buying that new compressor.

Furnished in two sizes; with piston displacements of 120, and 240 cubic feet of free air.

Free running engine clutch—balanced crankshaft—force-feed oiling system.

Write for Our Catalogs

O. K. CLUTCH & MACHINERY COMPANY, Columbia, Pa.

NO FRILLS!

found in the

BURCH CAR UNLOADER

Just a plain, substantially built Car Unloader—that will save you plenty of money and be a source of pleasure to use.

NO FADS!



BURCH
CAR
UNLOADER

Write for our Catalog

THE BURCH CORPORATION, CRESTLINE, OHIO

"Anchor" Pays for itself in a week
by time, money and labor
saved. Handy on every job.



Puller-jack

Only \$36



A ONE-MAN outfit that does the work of a gang. Spots railroad cars, draws concrete forms, shifts tracks, handy on steel erection, warping barges, wrecking, tightens guy wires—lifts, shifts, pulls, holds. 1,000 uses on every job. Good for 10,000 lbs. pull.

At your jobbers or order direct. Outfit includes 3 1/2-ft. tail chain, 15-ft. load chain and sheave block—for changing direction or double-strength pull. Complete \$36.00 f. o. b. works, Reynoldsville, Pa. (Longer chains quoted). Write for bulletin No. 26

T. H. EDELBLUTE COMPANY

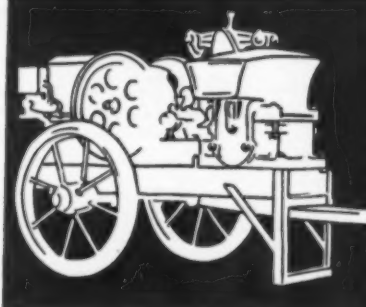
Oliver Building S Pittsburgh, Pa.

Also Manufacturers of "Anchor" Track Beams
and "Anchor" Retainers



Easily handled
by one man

No
Back-
Breaking



You don't break your back to change the diaphragm of this Rex 4' Pump—nor smash fingers. Just loosen four bolts and diaphragm is exposed for easy change. And: Pump is trailer mounted—gears run in oil—bronze-bushings lick wear—power supplied by automotive type 3 h.p. Le Roi.

REX PUMPS

This coupon brings the details
on the Rex 4' Diaphragm and
other Rex Pumps—and their
jobs.

CHAIN BELT COMPANY

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LITERATURE FREE FOR CONTRACTORS

These especially selected catalogs and pamphlets
of value to contractors are for free distribution.
You will find it worth while to check these lists
each month and write for the catalogs you need.

A 4-CYLINDER MOTOR ROLLER

A catalog describing the Huber 4-cylinder motor roller ranging in size from 5 to 15 tons may be secured by those interested from the Huber Manufacturing Co., 330 E. Center St., Marion, Ohio.

GROUND PRESSURE DATA

This is the title of a booklet dealing with the value of low ground pressure to contractors and describing how the ground pressure of crawler shovels, cranes and draglines should be figured, and may be secured by those interested from Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DELIVERING CONCRETE AT LOW COST

The Parke Concrete Carrier, which is made in capacities up to 5 cubic yards, is adaptable to any standard chassis and dumps by gravity from its normal position when the door is opened, is described in literature which the Parke Concrete Carrier, Inc., 7 Day St., New York will be glad to send on request.

A NEW STANDARDIZED ELEVATOR DRIVE

Book No. 1086 describing the Caldwell elevator drive for bucket elevators of the centrifugal discharge, perfect discharge or continuous bucket types which require from 2 to 15 horsepower may be secured from H. W. Caldwell & Son Co., 2410 West 18th St., Chicago, Ill., division of Link Belt Co., 910 South Michigan Ave., Chicago.

A NEW ROD FOR CARBON ARC WELDING

A new welding rod has been developed by the Fusion Welding Corp., 103rd St. & Torrence Ave., Chicago, Ill., for carbon arc welding. Complete data on this Weldite C-No. 6 Fluxed rod which is particularly adaptable for the welding of mild plates and castings, may be secured on request.

THREE-WHEEL WAGON GRADER

Form No. 1181 of Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., describes the new Ball wagon grader which is designed for an extremely short turning radius and can be turned with the tractor in a 16-foot roadway.

DRILLS FOR BLAST HOLE DRILLING

An illustrated bulletin describing the Loomis Clipper drills, fitted with crawler or round wheels and mounted on either steel or wooden frames and designed for drilling blast holes, building and foundation tests and similar uses will be sent on request by the Loomis Machine Co., 10th Street, Tiffin, Ohio.

A GEAR-OPERATED BULLDOZER

A bulldozer for mounting on Cletrac tractors which is gear operated, having a power transmission unit composed of a pinion and bevel gear, has been developed by Niess & Co., Inc., 1613 Polk St., Minneapolis, Minn., from whom complete information and prices on "The Bully" bulldozer may be secured.

NEW HEAVY DUTY SIX-WHEEL TRUCKS

Information regarding the two new heavy duty rear four-wheel drive trucks designed to carry heavy loads at high speeds which have recently been added to the line of the Sterling Motor Truck Co., Milwaukee, Wis., may be secured on request from this company.

TRACTOR EQUIPMENT

An 8 1/2 x 11-inch loose-leaf folder containing descriptive sheets and bulletins on various pieces of W-K-M tractor equipment, including side boom units, rock crushers, tank fillers, bulldozers, and backfilling and pipe handling equipment, may be secured by interested contractors and municipal officials on request from the W-K-M Co., Inc., Houston, Texas.

A NEW COMPACT POWER UNIT

Buda Co., Harvey, Ill., will be glad to send to those interested a complete description of its new Model H-199 compact light-weight power unit which is particularly adaptable to a large variety of industrial installations.

A FULL-REVOLVING POWER SHOVEL

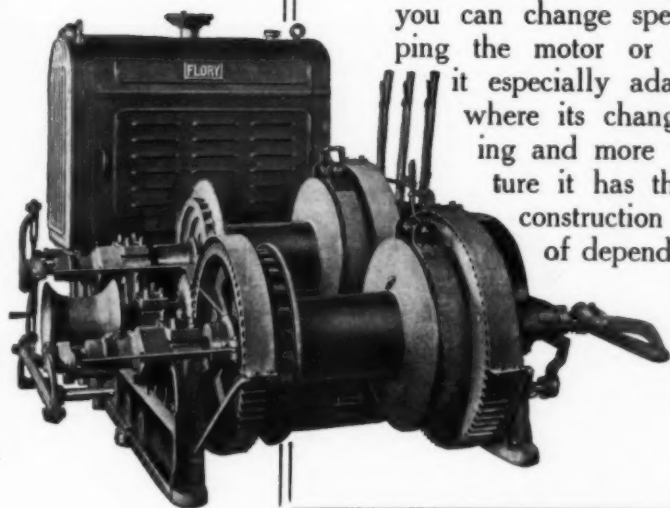
Literature describing the Ace of Spades, a new full-awing power shovel of 1/2-yard capacity, on which the swing, hoist and crowd are hydraulically controlled by a single easily operated hand lever, may be secured from the Western Manufacturing Co., Detroit, Mich.

A COMPLETE LINE OF DERRICKS AND WINCHES

Complete information in regard to the complete line of derricks and winches manufactured by the Saegen Derrick Co., 3103 Grand Ave., Chicago, Ill., may be secured from that company by those interested.

FLORY

2-SPEED EXCAVATOR HOIST



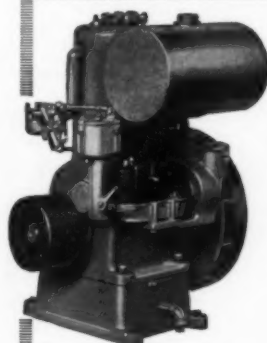
On the FLORY 2 Speed Slack Line Excavator Hoist you can change speeds instantaneously without stopping the motor or the hoist. This feature makes it especially adaptable to sand and gravel work where its change of speed means quicker hoisting and more work per day. Besides this feature it has the characteristic FLORY rugged construction which is a guarantee of years of dependable service.

S. FLORY MFG. CO.
BANGOR, PA.

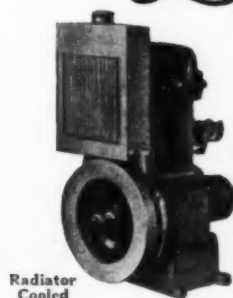
*FLORY builds Gasoline, Electric,
Steam Hoists; Cableways,
Carpullers, etc.*

SALES AGENTS IN PRINCIPAL CITIES

LAUSON



Air
Cooled



Radiator
Cooled

MANUFACTURERS!—You will insure satisfactory performance of your equipment by making Lauson Engines your standard motive power.

DISTRIBUTORS!—You will protect your reputation for supplying high grade, efficient equipment by specifying machines powered by Lauson Engines.

33 Years
Highest Reputation Guarantees
LAUSON Quality Performance

Vertical Motors and Horizontal Gas Engines

Substantial, Light-Weight Automotive Type Verticals

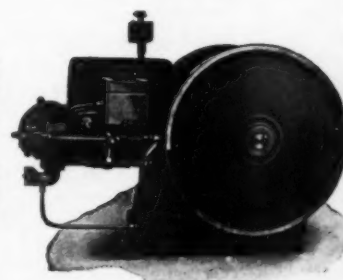
Air- and Water-Cooled

Specially suited for application to all sorts of portable and stationary units used by road builders and general contractors. They are compact and self-contained with all working parts built to endure continuous, hard service. The Air-Cooled develops $1\frac{1}{2}$ hp. at 1200 r.p.m. and may be run up to 2000 r.p.m. The Water-Cooled develops $1\frac{1}{2}$ to $2\frac{1}{2}$ hp. according to speed.

Horizontal Engines $1\frac{1}{2}$ to 35 hp.

Built to finest automotive standards—such as Hutto ground cylinders, among many other unusual shop practices on engines of this type. A wide variety—get our special catalog.

We also build Concrete Mixers, Single - and Double - Diaphragm Pumps, Heavy-Duty Power Units 35-60 hp., Contractors Saw Rigs, Plaster and Mortar Mixers and Contractors' Road Tractors.



—Write for complete details on LAUSON Engines—

The JOHN LAUSON MFG. CO. 11 Jackson Street, New Holstein, Wis.

The HEAVIEST LOAD EVER MOVED with ONE TRAILER



—on a 65 Ton ROGERS

This subway tunnel shield (167 tons including blocking) was recently moved by the Gerosa Haulage & Warehouse Corp. of New York on their 65-ton Rogers Trailer.

Such enormous overloads, while not recommended, clearly prove the unequalled strength built into every Rogers Trailer from the 7½ ton model to the 80.

Write for Catalog

Rogers Brothers Corporation
108 Orchard St. Albion, Pa.



Dependable

BAKER MANEY Self Loading Scrapers

Continually improved, Baker Maney's are foremost in the minds of those who use only dependable earth movers. So it is with every piece of Baker Tractor Equipment.



Write for these Bulletins:

Baker Maney Scrapers ☐
Baker Rotary Scrapers ☐
Baker Bulldozers ☐
Baker Maintainers ☐

THE BAKER MFG. CO.
585 Stanford Avenue,
Springfield, Illinois

Do you check over this list each month? Get the Habit. It will save you money to be up-to-date on equipment

A COMPLETE LINE OF WHEELS

Catalogs describing the complete line of mounting equipment for construction machinery, including wheels, trucks, trailers, crawlers and parts which are built for individual requirements, may be secured from the Electric Wheel Co., Dept. CM, Quincy, Ill.

A COMPLETE LINE OF CONSTRUCTION EQUIPMENT

A new bulletin describing the 54 items of equipment manufactured by the members of the National Equipment Corp., and depicting many of these pieces of equipment may be secured by those interested from the National Equipment Corp., 30th St. and Concordia Ave., Milwaukee, Wis.

A READY-MIXED CONCRETE CARRIER

Literature describing the Biehl ready-mixed concrete carrier which is designed for carrying ready-mixed concrete from the central mixing plant to the job and is powered by a separate motor which can be operated at a uniform speed, may be secured from the Biehl Iron Works, Inc., Reading, Pa.

SELF-PRIMING CENTRIFUGALS

Barnes Manufacturing Co., Mansfield, Ohio, will be glad to send to those interested literature describing the new Barnes self-priming centrifugal pump, the self-priming unit of which requires no attention other than the addition of a small quantity of oil to the air pump about once a week.

EXPANSION JOINTS FOR HIGHWAYS

Literature describing the Ohio expansion joint which consists of a center reinforcing and an expansion core and also the compressible sponge rubber expansion joint, may be secured on request from the Ohio Fibrated Asphalt and Rubber Co., 304 South Dearborn St., Chicago, Ill.

CONCRETE AND METAL LATH BUILDING SPECIALTIES

Catalog No. 229 recently issued by the Union Steel Products Co., Albion, Mich., completely describes Union reinforced concrete and metal lath building specialties including the expandable reed clip for beam wrapping, the snap-in joist bar spacer and the continuous sleeper spacing anchor.

A DETACHABLE HOIST FOR TRACTOR MOUNTING

A hoist built to give service under hard and continuous usage and generously proportioned to insure long life, has been developed by the Trackson Co., 519 Clinton St., Milwaukee, Wis., for mounting on the McCormick-Deering 10-20 tractor and is described in Form No. 225.

NEW BEARING METAL FOR CONSTRUCTION EQUIPMENT

Bearium, a new bearing metal marketed by the Universal Bearing Metals Corp., 258 State St., Rochester, N. Y., has the property of being able to function as a bearing regardless of operating conditions without injury to the shaft. Complete information regarding this metal may be secured on request.

NEW FRACTIONAL HORSEPOWER GAS ENGINE

A new fractional horsepower gasoline engine, known as the Cushman Husky, designed for general purpose service and suitable for driving small compressors, pumps or electric lighting sets, is described in literature which may be secured from the Cushman Motor Works, Lincoln, Nebr.

A CATALOG AND DATA BOOK ON IDLERS FOR CONVEYORS

The Stearns Conveyor Co., Cleveland, Ohio, a division of Chain-Belt Co., 766 Park St., Milwaukee, Wis., has completed a catalog and engineering data book containing complete and specialized information on the design and application of Rex-Stearns Timken idlers for all types of conveyors, together with all allied and auxiliary equipment necessary for complete belt conveyor installations.

AN AUTOMATIC FUEL-TANK FILLER

Literature describing the Simplex fuel-tank filler, an automatic device for filling the gasoline tank of a tractor, shovel or any other piece of equipment in the field from the customary drum or tank wagon, may be secured from the Simplex Fuel-Tank Filler Co., 651 Brannan St., San Francisco, Calif.

RULES AND CAUTIONS FOR THE USE OF WELDED CHAIN

An interesting and valuable book, which gives in a concise manner facts and figures concerning all types of welded chain, tables of sizes, weights, loads and directions for taking measurements, tells how to order chain, and contains the rules and cautions issued by the Chain Institute, has recently been prepared by the American Chain Co., Inc., Bridgeport, Conn.

NEW SHOVEL WITH ONE-PIECE GEAR CASE

A one-piece gear case which encloses all of the operating mechanism is a feature of the new Unit 512 designed by the Universal Power Shovel Co., Division of the Unit Corporation of America, Milwaukee, Wis., from which complete information may be secured.

A 6-YARD STEEL DUMP WAGON

A new 6-yard dump wagon built largely of steel and equipped with a track of the 10-ton size, has been placed on the market by LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, who will send complete information on request.

DIESEL ENGINES FOR DREDGES

Bulletin 98 describing McIntosh & Seymour diesel engines, both stationary and marine, discussing the use of diesel engines for dredge power, their cost, efficiency and maintenance may be secured by those interested from McIntosh & Seymour Corp., Auburn, N. Y.

FREEMAN

4

wheel drive trucks

You don't hear much of "William the Conqueror" these days—but you *do* hear a lot about "FREEMAN THE CONQUEROR."

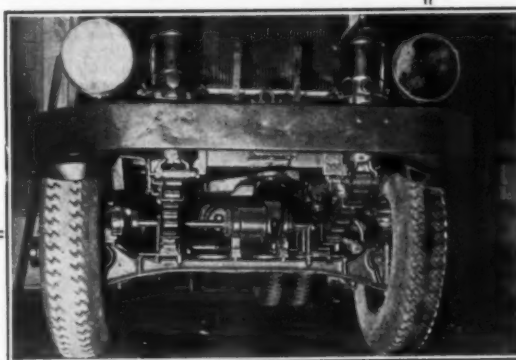
The new FREEMAN Four Wheel Drive, Front Wheel Steer, Truck "conquers when all other trucks fail."

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COMPANY**

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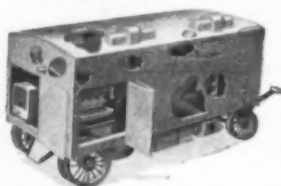
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For Paving or Patching with Asphalt



The patch plant is entirely automatic.
Weight is 9,900 pounds.
Powered by a 20-H.P. gasoline power unit.
Pug-mill mixer of 300 pound capacity.
Dryer-drum is of the internally oil fired type.
Is self-propelled so that it

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Has oil-fired tool heater.
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SWEDISH HOLLOW DRILL STEEL

Hollow Drills, Pavement Breakers and Asphalt

Cutters to fit all standard pneumatic hammers.

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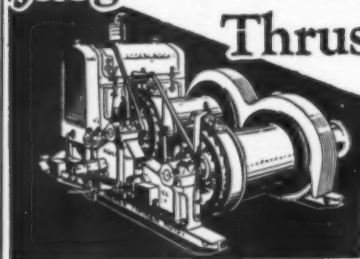
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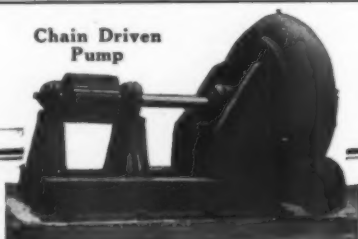


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be up-to-date on equipment**

A FAST CONVERTIBLE TRACTOR SHOVEL

A 24-page booklet describing the Bay City tractor shovel which is fast, easily convertible into shovel, trencher, dragline or crane and is particularly adapted to work in close quarters may be secured by those interested from Bay City Shovels, Inc., Bay City, Mich.

A VERSATILE TRACTOR IN A NEW SIZE

Folder MS-49 describing the new Allis-Chalmers No. 35 Monarch tractor which has the general design, construction and appearance of the larger machines, will be sent on request to interested contractors by the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A SMALL SHOVEL FOR WORK IN RESTRICTED PLACES

Bulletin 40-B describing the Nordberg-Butler shovel Model No. 110, which will work in a minimum drift of 5½ feet in width by 7 feet in height and at the same time will clean up a path 18 feet in width in wide tunnels or stopes, may be secured from the Nordberg Mfg. Co., Milwaukee, Wis.

TWO-WHEEL HEAVY DUTY SCRAPERS

The True-Trac scraper which loads, transports, dumps and spreads sand, dirt, stone or sod without the need of preliminary plowing, all under the supervision of the driver of the tractor, has been developed by and is described in the literature of the Shaw Excavator & Tools Co., Worthington, Ohio.

NEW FOUR-POSTER DIE STOCKS

Bulletin C-1 describing the new Beaver 1 to 2-inch die stocks for threading 1, 1¼, 1½ and 2-inch pipe which are made in two styles, the wholly self-contained type with no loose parts or the four-post type with a separate set of dies for each size of pipe, may be secured from the Borden Co., Warren, Ohio.

ADJUSTABLE SCREED GAGES

Literature describing the M & M adjustable screed gages for leveling concrete slabs, which are easily adjusted and may be used over and over, will be sent to those interested by the M & M Wire Clamp Co., 983 17th Ave., S.E., Minneapolis, Minn.

A ONE-MAN TRACTOR-DRAWN SELF-LOADING SCRAPER

Quick action self-loading scrapers in 2, 3½ and 5½-cubic yard capacities are made by the Highway Trailer Co., Edgerton, Wis., from whom complete information and literature may be secured on request.

AN AUTOMATIC DUMP BOX FOR CEMENT HANDLING

Literature describing Turn-O-Matic cement boxes of all-steel construction which are fastened on the frame of the truck to transport the cement from the batcher to the mixing plant will be sent to those interested by George O. Harm Co., Warren, Ohio.

EXPANSION JOINTS FOR CONCRETE HIGHWAYS

Literature describing the Corkin asphaltic expansion joint which is made to conform to state, county and city specifications in standard sizes, including thicknesses of ¼, ½, ¾, 1, 1½, 2, 3, 4, 6 and 12 inches and widths of from 4 to 12 inches, may be secured from the Colphait Co. of Ohio, Western Reserve Bldg., Cleveland, Ohio.

THE ELEVATING GRADER AS A DIRT MOVER

The Caterpillar elevating grader which has been made more practical by a direct power take-off from the motor on the tractor pulling it, thus eliminating an auxiliary motor or bull wheel is described in literature which will be sent on request by the Caterpillar Tractor Co., San Leandro, Calif.

A SIDE LOADING MIXER WITH NON-CLOGGING CHARGING SKIP

An automatic skip bumper in connection with the stream line charging skip is one of the features of the new Wonder 5-S and 7-S mixers made by the Construction Machinery Co., Box M, Station A, Waterloo, Iowa, and described in Bulletin 2912.

A BAND SAW WITH BUILT-IN MOTOR

The Monarch ball-bearing band saw made by the American Saw Mill Machinery Co., 171 Main St., Hackettstown, N. J., which has the motor built into the base and so protected that no injury can result, is described in literature which may be secured on request from this company.

A NEW TOOL FOR CLEANING STEEL

The Concrete Surfacing Machinery Co., 4557 Spring Grove Ave., Cincinnati, Ohio, has developed a tool which may be either electrically or pneumatically operated for cleaning mill scale, paint and rust preparatory to painting. Complete information may be secured on request.

ELECTRIC OR GASOLINE POWERED HOISTS

A complete description of the new line of gasoline or electric powered hoists in seven sizes, ranging from 2 to 27-horsepower, in the usual Duke design may be secured by those interested from the Duke Engine Co., Grand Haven, Mich.

A V-TYPE TWO-STAGE PORTABLE AIR COMPRESSOR

Catalogs No. B-800 and B-852 describing Westinghouse National WN-24 and WN-33 type two-stage engine-driven portable air compressors with one-piece cast steel frame and full semi-elliptic spring suspension, may be secured from the National Brake & Electric Co., Milwaukee, Wis.

A HANDBOOK OF METAL LATH CONSTRUCTION

The Gensfe Steel Co., Youngstown, Ohio, has just issued a 52-page metal lath handbook which is complete with specifications and technical data for the use of metal lath and accessories following standard practices of lathing and plastering associations and conforming to the schedule of simplified practice No. 3, U. S. Department of Commerce.



Are You Proud of Your Plant?

If So Tell Your Friends

One of our customers had a little Road Show all of his own. He had a 430 ton three-compartment Erie AggreMeter Plant and was so well pleased with the job that he invited all the material people in that section near by.

Even a number of our competitors were there and one man was able to weigh and load batch after batch in thirty-five seconds without spilling a stone.

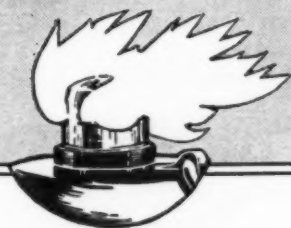
This was a three material batch for 2½ cu. yd. mixer. You can do the same with an Erie AggreMeter Plant.

*Send for the New
AggreMeter Catalog*

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CONSTRUCTION CO.**

ERIE, PENNA.

Only the TOLEDO has the efficient Economy Burner



—the burner that cuts fuel cost in two, eliminates wick consumption, produces a flashing, unquenchable flame—a warning in light that cannot be ignored. No other torch has this burner in so perfected a form.

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AND KEEPS OUT MUD, WATER AND SAND

Ramming equipment through squishy, black mud . . . terrific heat generated by continuous heavy duty . . . days of tough work ahead. . . No time for lubricating failures and breakdowns!

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THE NEW

Concrete Accelerator and Hardener

An integral liquid compound to assist contractors in making better concrete. Acqua-Pruf is a compound that has an affinity for portland cement. One quart to the bag is the standard proportion that has by test produced a compressive strength 50% in excess of untreated concrete. This enables walks, paving, etc., to be opened to traffic in 24 hours.

Acqua-Pruf treated concrete can be poured at temperatures as low as 10 degrees above zero.

The manufacturers guarantee that Acqua-Pruf contains no acids or other elements in a form that will attack reinforcing.

ACQUA-PRUF, INC.,

393 Seventh Ave.

New York City

Hayward Buckets



Let Hayward Engineers recommend a bucket to fit the job. The Hayward line includes Clam Shell, Orange Peel, Drag Line and Electric Motor Buckets; Dredging, Excavating and Coal Handling Machinery; Automatic Take-up Reels; Counter-weight Drums.

THE HAYWARD COMPANY

32-36 Dey Street

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Get the Habit. It will save you money to
be up-to-date on equipment

A COMPLETE LINE OF HOISTS

Mundy steam, gas and electric hoists, dredge hoists, belt hoists, ship, cargo and dock winches, capstans and cableways are described in literature which the J. S. Mundy Hoisting Engine Co., 722-40 Frelinghuysen Ave., Newark, N. J., will send on request.

A NEW CONCRETE ACCELERATOR AND HARDENER

Complete information in regard to Acqua-Pruf, an integral liquid compound which has an affinity for portland cement, accelerates the hardening of concrete, increases its compressive strength and enables paving to be opened to traffic in 24 hours, may be secured by those interested from Acqua-Pruf, Inc., 393 Seventh Ave., New York.

CAST IRON PIPE MADE IN NEW THICKNESSES

In addition to being made in accordance with U. S. specifications, delavand cast iron pipe is now being made in the various thicknesses and weights shown in the American Waterworks Association and American Gas Association specifications. Complete information may be secured from the United States Pipe & Foundry Co., Burlington, N. J.

A NEW LINE OF PORTABLE AIR COMPRESSORS

Descriptive literature on the new line of Buhl portable air compressors, whose new design embodies a number of improvements and which are obtainable in 36, 55, 90, 110, 220 and 330-cubic foot capacities, will be sent on request by the Buhl Co., Old Colony Bldg., Chicago, Ill.

WELDED STEEL JOINTS, FORMS AND CURB BARS

Truscon Steel Co., Highway Division, Youngstown, Ohio, will be glad to send to those interested complete information in regard to welded steel fabric contraction joints, steel road forms, rib and curb bars and Types A and B air-cushion expansion joints for reinforcing concrete roads and pavements.

PORTABLE AND STATIONARY BELT CONVEYORS

Descriptive bulletins on Chicago Automatic portable and stationary belt conveyors, as well as bucket elevators and screens, may be secured by those interested from the Chicago Automatic Conveyor Co., 1853 South 55th Street, Cicero, Ill.

AN EMERGENCY JACK

No. 310 Simplex jack, which is a combination vertical and tilting jack, flexible and adaptable to a variety of uses and emergencies is described in literature which Templeton, Kenly & Co., Chicago, Ill., will be glad to send on request.

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Portable asphalt plants for street maintenance

Oil burning tar kettles, 1, 2, 3 and 6 barrel sizes

Oil burning fire wagons

Surface heaters

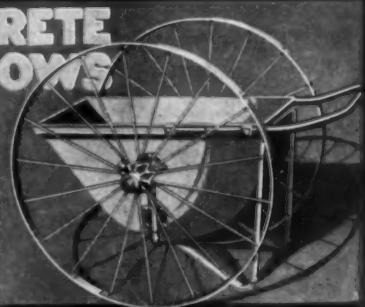
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**An ideal plant for the
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or Contractor—
this *Good Roads***

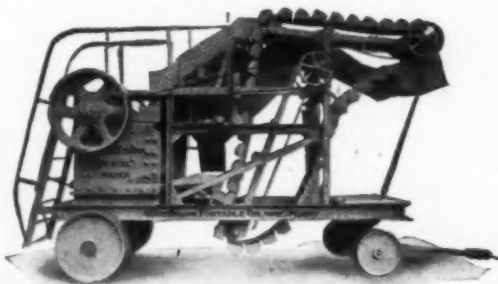


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Y-90

Y-90 "Good Roads" Portable Gravel Plant complete, except for Motor, ready for operation.

**PORTABLE CRUSHING, SCREENING
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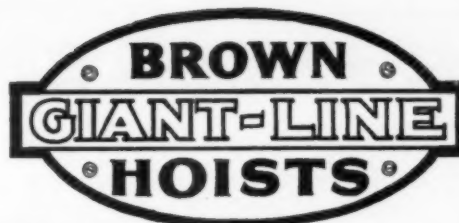
with or without power. Equipped with the famous CHAMPION ROLLER BEARING REDUCTION CRUSHER (having S K F Self-aligning bearings throughout) for reducing the oversize. A complete, compact and highly efficient plant. Strictly "closed circuit" system—no rejections. Capacity 300 to 350 cu. yds. per day. Weight (no power) 20,000 lbs.



Y-90 "Good Roads" Portable Gravel Plant with Elevator folded, ready for trailing to a new location.

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The line today includes a type and size adapted to every requirement in 4, 6, 8, 10, 12, 15, 20, 24, 28, 32, 35, 40 and 50 horsepower—gasoline or electric powered.

Outstanding values are made possible by twenty-five years' specialization—one standardized design—an "up on its toes organization" and unexcelled production facilities, including our own modern foundry.

**BROWN "GIANT-LINE" HOISTS
ARE MANUFACTURED PRACTICALLY 100% IN OUR OWN PLANT**

Submit your requirements—Catalog E-1 upon request

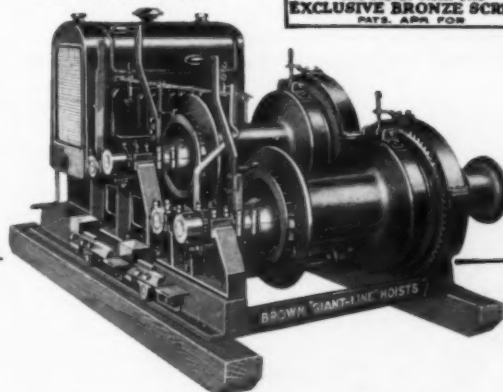
**THE BROWN CLUTCH
COMPANY**

Sandusky, Ohio, U. S. A.

No replacement of a
Brown Bronze Screw Thrust
has ever been made!



The Hoist With The
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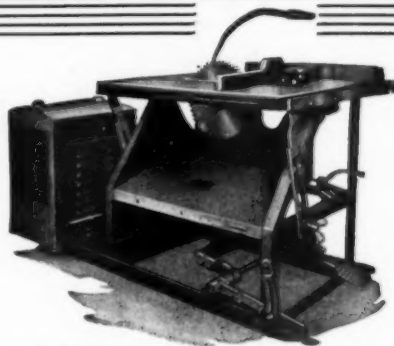
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The Super Woodworker will easily and quickly make all cuts necessary in preparing forms. The combination of swinging arbor and tilting table makes this an ideal machine for this work.

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THE SUPERIOR SUPER WOODWORKER

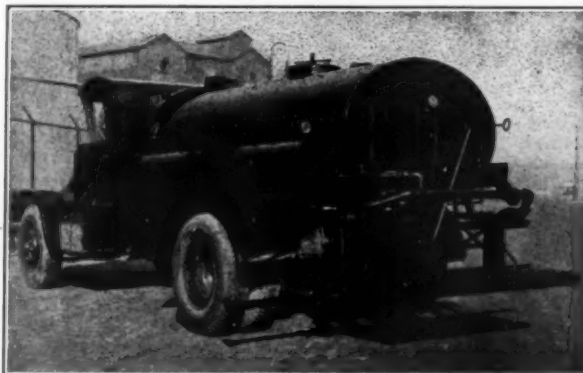
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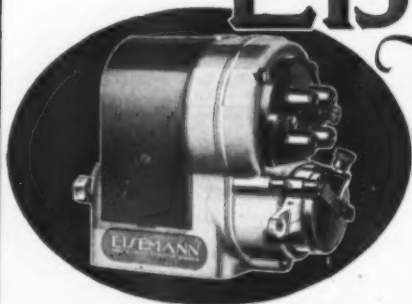
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HOISTS BUILT ESPECIALLY FOR CONTRACTORS

Like the
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DAKE LG HOISTS Meet Schedules!

Daily, the Dake LG Hoists are proving their dependability by their consistent adherence to building schedules.

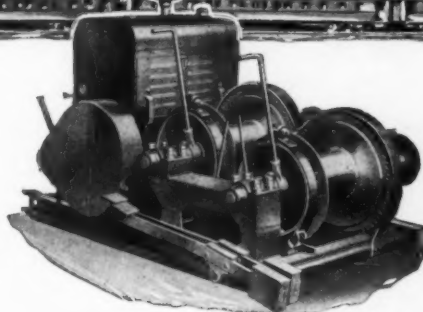
The name DAKE has long been synonymous with compactness, simplicity, and dependability among contractors using steam powered machinery.

The new gasoline and electric Dake LG Hoists embody these same ideas of lightness and portability, together with rugged strength, dependability and durability.

If you are not familiar with the features of Dake LG Hoists that afford these characteristics, write for catalog.

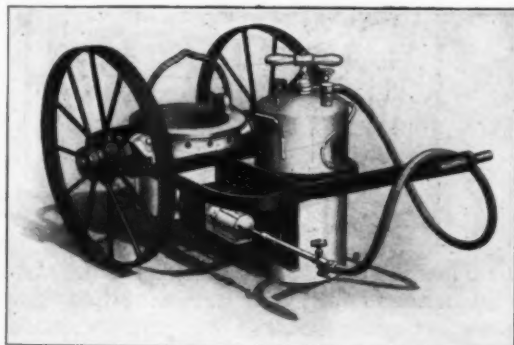
A free catalog will be mailed upon request.

Dake LG Hoists range from 2 HP. to 27 HP. and are priced from \$250.00 to \$2200.00, f.o.b. Grand Haven.



DAKE ENGINE COMPANY

Grand
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This is Portable Oil Burning Lead Melting Furnace No. 33-OB. You will find this outfit easy to handle, economical in the use of fuel, and remarkably efficient in melting lead.

LEAD FURNACES, TOO for Contractors

A LONG with our All-Steel Tool Boxes, Tar and Asphalt Kettles, Sand Dryers and Mechanical Grout Mixers, we have a complete line of oil and wood burning Compound and Lead Melting Furnaces. We invite you to write for full particulars and prices. You will be under no obligation to us.



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ALL-STEEL
TOOL BOXES

LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

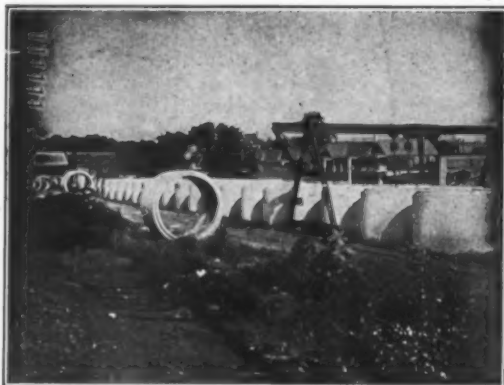
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 REINFORCED CONCRETE PIPE
"It makes a better joint"

**Easily laid at
 small expense
 with perfect
 flow line.**

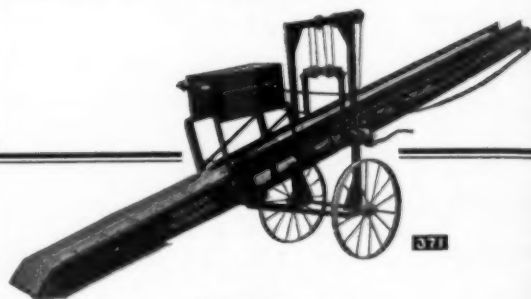


**NEWARK CONCRETE
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323 Broadway
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USE CONVEYORS



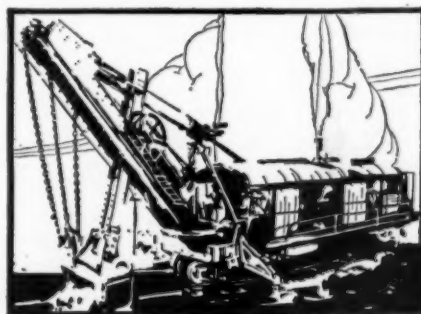
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Write for Descriptive Bulletins

HANDLE

**YOUR MATERIALS WITH
 CHICAGO AUTOMATIC
 CONVEYORS**

Chicago Automatic Conveyor Co.
Originators of the Portable Conveyor
 1853 South 55th Ave. Cicero, Illinois
Agents in all principal cities



**There's hardly a place on this shovel
 where Dixon's Waterproof Graphite
 Grease won't ease severe service**

For this lubricant has GRAPHITE as an element. It gives wearing surfaces a remarkable smoothness and protects them.

For gears chains and wire ropes exposed to every climatic condition, Dixon's Waterproof Graphite Grease not only lubricates, and prevents rust, but adheres to the moving parts at any speed. It is not wasted. It cannot gum—it always protects and lubricates.

There are Dixon Graphite Products for cranes, derricks, dredges, pump plungers, belts, pipe joints—for any type of machine or service—and there is economy in using them.

The quickest way to know the facts for yourself is to write for Circular 86-W and samples.

Joseph Dixon Crucible Co.
 Established 1827
 Jersey City New Jersey

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DOES THE

Thor "6"

AIR COMPRESSOR

HAVE A

SUPER-CHARGER



The THOR "6" Air Compressor has a Super-Charger for only one reason—so that it will actually deliver more air than any other compressor of the same size or rating.

This Super-Charger feature is not just "sales-talk." It means more air delivery for your money which is what you want in a compressor. It means that you can buy a THOR Compressor rated at 250 cubic feet instead of the usual 310 cubic feet machine and operate just as many tools; or you can buy a THOR Compressor rated at 116 cubic feet instead of a 160-cubic foot size and accomplish the same results. And this means quite a saving of money to you which is an important consideration.

The Rix Super-Charger is an exclusive, patented feature of the THOR that enables the piston on its idle or downward stroke to compress the additional air the THOR delivers. And the Super-Charger adds no complications. It is simple, fool-proof and efficient.

Before buying your next compressor, investigate the THOR. Find out why you can get more air for your money. You'll find it well worth while. Complete information is yours for the asking.

INDEPENDENT
PNEUMATIC TOOL CO.
 New York 37 YEARS OF London
 PNEUMATIC TOOLS—ELECTRIC  AIR-EXPERIENCE TOOLS—AIR COMPRESSORS
 248 S. JEFFERSON ST., CHICAGO, ILL.

Action! Speed! Profits!



with

Davenports

Like many other contractors, you will feel mighty grateful for the foresight that put Davenport Crawler Wagons on your road building or other dirt moving jobs. It's a mighty good feeling to find yourself way ahead of schedule with an unexpectedly neat profit in prospect.

Davenports give you the nearest approach to uninterrupted service. Bad weather and poor ground conditions mean nothing to Davenport Crawler Wagons. A holiday for the mules is a profit producing work day for these sturdy, smooth running BETTER wagons. If you aren't Davenport equipped, write us today for further information regarding these improved crawler dump wagons. You will be impressed by the advanced features which mean Action! Speed! Profits!



Notice how axle breakage due to twist has been done away with by employment of the "H" type axle frame. This improved frame supports tread wheel axles at the ENDS instead of the middle.

Davenport
Locomotive & Mfg. Corp.
 Davenport, Iowa

DAVENPORT
CAT-TREAD WAGONS

Hotstuf
TRADE MARK

Melts 5,000 pounds in 8 Hours

That's what this 50 gallon Model "T" Asphalt Heater will do. 30% greater melting capacity than any other Heater on the market. And uses 30% less fuel. The exclusive elevated melting chamber provides for many profitable advantages. Burned out bottoms are practically unknown with HOTSTUF Heaters.



and supplies. Double covers are waterproof and can be locked down.

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MOHAWK ASPHALT HEATER CO.

68 WEAVER ST., SCHENECTADY, N. Y.

Hundreds of these all steel MOHAWK HI-SPEED TRAILER TOOL BOXES are in use by contractors from coast to coast. Compartments, shelves, partitions for tools



A WARCO Job in York County, Pennsylvania

Mr. Linn Nell, contractor of New Cumberland, Pa., relocating a township road in Newberry Township, York County, Pennsylvania.

The flexibility of his WARCO Model "E" power grader is well demonstrated in the picture.

A WARCO power grader is a good thing to have on any road job—either construction or maintenance.

W. A. RIDDELL COMPANY

BUYCRUS OH JO

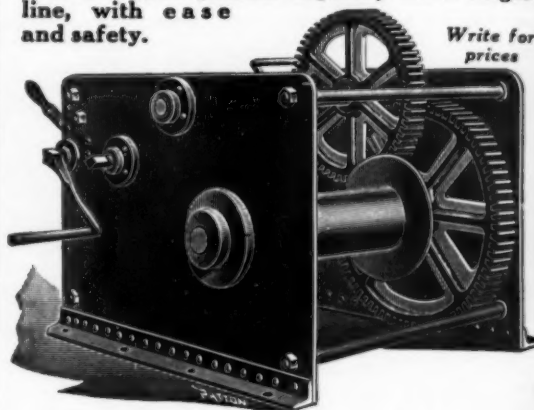
Power Graders — Wheeled Scoops — Rear-Type Crawlers

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Busters Remove Old Foundations

Old concrete foundation had to be broken up for the shovel, on this job. Blasting was "out" on account of windows.

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First, these tools have a reputation for being rugged, fast-working concrete breakers. And they are easily handled and have low repair cost.

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For they remove concrete or asphalt pavement—de-



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SULLIVAN MACHINERY COMPANY
814 WRIGLEY BUILDING, CHICAGO



have you seen such a Digger!

For ability to dig hard material, the new WILLIAMS "Champion" goes beyond any previous bucket.

21 IMPROVEMENTS—including corner bars extending beyond the scoops, giving extra leverage—welded scoops of new easy-filling design—larger diameter sheaves—narrower and more rigid head.

And many other improvements have made it possible to place the new WILLIAMS "Champion" on your work with the definite guarantee to outdig any other bucket.

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Branch Offices: New York, Pittsburgh, Chicago

WILLIAMS
BUCKETS—TRAILERS

Before you buy a bucket, it will pay you to try the new WILLIAMS "Champion"—it challenges competition, and invites comparative tests.

157

"DOMESTIC" PUMPS for CONTRACTORS

Their Use Means SAFETY SPEED and PROFITS



"DOMESTIC" PUMPS
THE STANDARD OF COMPARISON
FOR A QUARTER OF A CENTURY

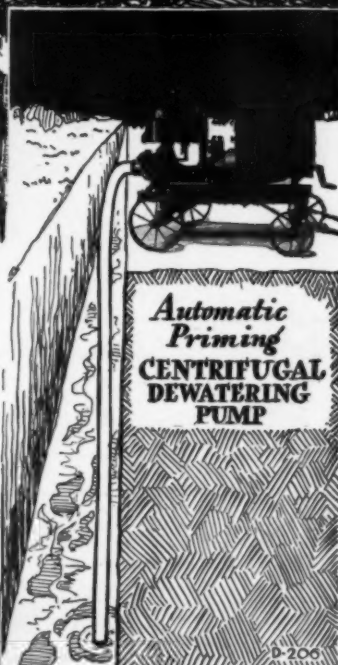
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Types: Simplex, Duplex, Triplex,
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Capacities: 20 to 200 G.P.M.

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Types: Diaphragm, Plunger and
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SHIPPENSBURG, PENNA.



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DEWATERING
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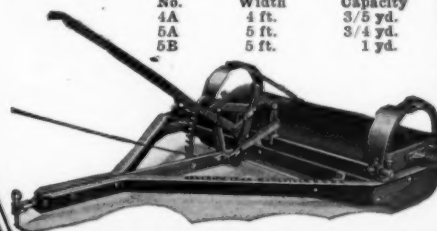


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of the hardest dirt moving jobs
Fast—Steady—Trouble-free—Low Cost

For Road Grading—Airport Construction—Golf Courses—Parks—Real Estate Developments—Irrigation Projects—Filling—General Leveling Operations and all other Dirt Moving Jobs.

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4A	4 ft.	3/5 yd.
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**Handles like a 7S
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*Built of Steel - 1/2
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Skip Shaker loader, remixing drum action, Accurate Measure Water Tank and fast discharge (8 to 11 seconds) mean more thoro mixed concrete per day. Machined steel tracks, chilled ground faced rollers and ball bearings save power, save wear. Direct drive, one man control, dual tires for soft and hard ground.

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**100%
BALL
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SPEED KING**



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"A Hotel Distinctively Different"

**UNEXCELLED COLONIAL
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NOW READY FOR YOU!

FROM \$4.00 DAILY—EUROPEAN PLAN
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With Showers and Baths
Fireproof Construction Throughout

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EUGENE C. FETTER, MANAGING DIRECTOR

They did a thorough construction job here!



Atlantic Boulevard, near Signal Hill, at Long Branch, California. This smooth, forty-foot concrete highway, which carries heavy truck traffic through the oil fields, is protected against expansion and contraction strains by Carey Elastite Expansion Joint.

WHEN the contractors built this fine boulevard through the oil fields of California, they insured its lasting smoothness. They provided for inevitable expansion and contraction—protected the concrete, perfectly and permanently, with Carey Elastite Expansion Joint.

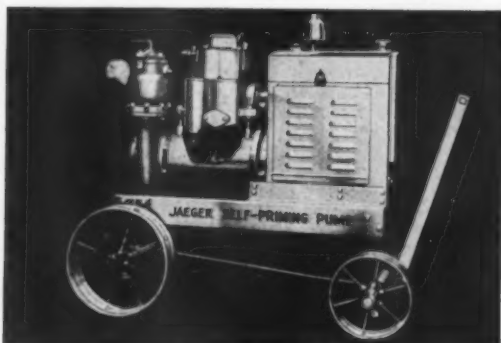
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The pioneer Carey Elastite Expansion Joint, now being used in every State in the Union, is preformed under heavy pressure—compounds of asphalt and fibre, sandwiched between sheets of asphalt-saturated felt. Flexible—never brittle or runny at any temperature. Indispensable for roads and sidewalks, bridges and dams, airport runways and pavements—in all concrete construction work. Have us send you our illustrated manual on Expansion Joint installation.

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EXPANSION
JOINT

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100% SELF-PRIMING CENTRIFUGALS

No Primers...No Foot Valves

YOU'LL handle up to 3 times the work with this 100% automatic pump...and get a new idea of low pumping costs.

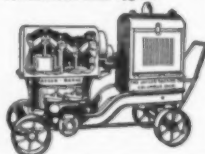
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SPEED BOY Centrifugal \$167.50 complete.

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Contractors and road pumps...all sizes and types.



Makes Roads as Even as a Billiard Table!

Concrete roads and concrete asphalt streets are evenly, quickly, economically surfaced by the BERG. No other tool or method like it. A one-man machine that does the work of ten men. Low operating cost. Used and endorsed by State highway departments, municipalities, leading contractors and engineers. Complete information gladly mailed upon request. Write

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Super Strength Plus

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THE MODERN METHOD OF BUILDING BETTER ROADS

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Warren Avenue, Hammond, Indiana. Asphaltic Concrete pavement.

STANOLIND PAVING ASPHALT



Summit Ave., St. Paul. Constructed with Stanolind Sheet Asphalt.

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FOR over fifteen years the Standard Oil Company (Indiana) has furnished Asphaltic Concrete and Sheet Asphalt to cities and towns in the Middle West. The pavements on which these asphalts have been used are giving their full value of service. You will find such pavements will also give you highly satisfactory service.

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Asphalt and Road Oil for Low Cost Improved Roads

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Dependable Power

in sizes ranging
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LE ROI ENGINES

for dependable power!

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Distinctive in Man Power, Safety & Simplicity

Templeton, Kenly & Co., Chicago, U.S.A.
The World's Largest Manufacturers of Jacks
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**The
ANDERSON**

A New and Improved
SAFETY HOOK

The ANDERSON hook is absolutely safe under all conditions and is an essential part of hoisting equipment wherever hooks are required.

This hook cannot accidentally become unfastened when attached to load nor will it, at any time, foul or snare projections or obstructions, whether carrying the load or running free.

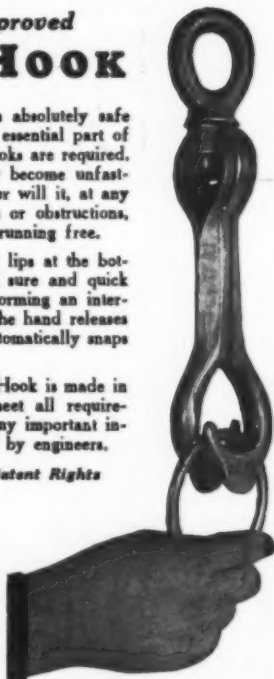
Note the re-inforcing, flared lips at the bottom of hook which provide a sure and quick method of attaching, thereby forming an interlocking link. A half-turn of the hand releases the attachment and the hook automatically snaps back to closed position.

The ANDERSON Safety Hook is made in varied designs and sizes to meet all requirements. It is being used in many important industries and is highly indorsed by engineers.

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New York,
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GREAT
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ROOMS WITH BATH
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HAROLD A. SAGE, Manager

LATZ
INC.

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"Hunt Process" The Unique Curing Medium

CONTRACTORS and engineers know that for every construction requirement there is one best method or material. By its use the particular result desired is attained most satisfactorily.

Such a material is the "Hunt Process." It has been developed and perfected for *one purpose only*—to embody in one curing medium all the advantages contractors and engineers have long been searching for.

"Hunt Process" is a *processed compound*, composed chiefly of Trinidad type Lake Asphalt, Bermudez Asphalt and Gilsonite, blended at a high temperature, thinned to a working consistency with a petroleum solvent and combined with a pigment.

When this processed compound is applied to the concrete *immediately behind the finisher*, it dries quickly, forming a film which seals the original

mixing water into the concrete and thus provides ideal conditions for the hardening of the concrete.

As the concrete hardens, the film of "Hunt Process" also hardens, adhering closely to the surface of the concrete without penetrating it or entering into chemical combination with it.

The surface of the concrete retains the non-skid character given to it by the finisher because the film of "Hunt Process" adjusts itself to every marking on the surface.

Painstaking research has given the construction industry this unique material. Wherever concrete is placed "Hunt Process" enables engineers and contractors to secure the curing advantages that can be secured by no other method or material. Mail the coupon for informative booklet giving complete details.

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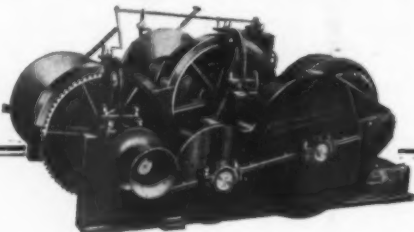
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Double-Drum Electric Hoist
STREET HOISTS ARE DEPENDABLE
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 Chattanooga, Tenn.



Style "J" Oil Burning Kettle equipped with Hand Spraying Attachment will guard any highway with economy and efficiency. Something easy to handle and quick to heat.

We manufacture a full line of Tar and Asphalt Kettles, Oil Burning Kettles, Oil Burners, Torches, Pouring Pots, Hand Spraying Attachments, etc. Send for "Blue Book" describing our equipment.

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"ANVIL BRAND" BLOCKS

FOR MANILA OR WIRE ROPE
 you are assured of
STRENGTH—SERVICE—SAFETY—

Made in all standard styles and sizes. Quotations gladly furnished on special blocks.
 Send for Catalog C. E.

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The NATIONAL CARBIDE V. G. LIGHT

Gives you daylight conditions on night jobs. Spreads a full, even beam of about 8000 candle-power right where you need it. Lights up the job for about nine hours on one 5-pound charge of National 14-ND Carbide and 5 gallons of water.

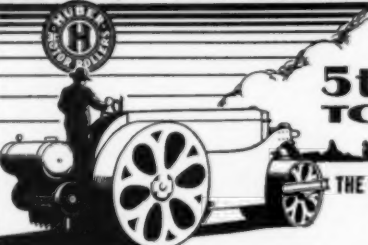
Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working.

Weight 30 pounds empty; 75 pounds when full.

Write for Catalogs on V-G Light, V-G Handy Light and Lantern

NATIONAL CARBIDE SALES CORP.
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5 to 15 TONS

THE HUBER MFG. COMPANY
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HUBER 4 CYLINDER MOTOR ROLLERS

SMALL SIZE LIGHT WEIGHT

The Contractor's Pump
"TADCO"
 DEPENDABILITY

One contractor has sixty-three pumps. Another has thirty-six. Many have ten or more each.

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HIGH EFFICIENCY HIGHEST SUCTION LIFT

"The Strongest Geared Power for Its Weight in the World"




CAPACITY 5 TONS
 STRAIGHT LINE
 POSITIVE INTERNAL BRAKE

Weight 110-lbs.
 Size 16x17x13-in. high
 Two Speeds 4 to 1 24 to 1

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It is packed full of interesting and valuable information on the work of the Sauerman Slackline Cableway on practically every kind of excavating job. There are many pictures and diagrams showing just how this cableway digs, conveys and elevates. And it shows how many users are cutting costs. It may show you how, too. Send for your copy today.

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No going is too tough for this sturdy, flexible deLavaud Pipe

When the trench climbs suddenly up a steep grade, as shown above, or curves abruptly to right or left, those are times when you will be grateful for the flexibility of deLavaud Pipe. When heavy rock contests every yard of the way and blasting is the order, then again you will be thankful for the lightness and the ease of installation and the remarkable strength of deLavaud Pipe.

Why is deLavaud Pipe strong and flexible? The answer to this question is found in the fine-grained structure of the metal, which in turn is due to the unique patented deLavaud process of manufacture.



deLavaud Pipe is centrifugally cast in a water-cooled metal mold. The action of this mold brings about the finely divided condition of the iron. All coarse particles are broken up and evenly distributed. Controlled annealing further improves the quality of deLavaud pipe metal. In addition

to making deLavaud pipe in accordance with U. S. government specifications, we are also furnishing this product in the various thicknesses and weights shown in the specifications of the American Water Works Association and the American Gas Association. Write for complete information.

United States Pipe and Foundry Co., Burlington, N.J.

Sales Offices:
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Our pipe bears the "Q-Check" trademark of The Cast Iron Pipe Research Association

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On a well-point job in South Chicago

A Humdinger self-priming centrifugal pump maintained a vacuum of 26 inches on a total of eighty-four 1½-inch well points, keeping the surrounding water level well below the bottom of the trench. Our standard 4-inch model with four-cylinder Le Roi engine, \$675 f.o.b. factory. We gladly furnish information on all models.

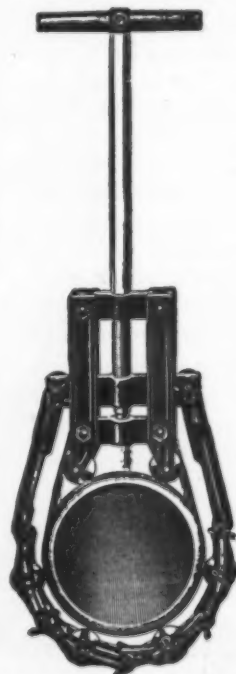


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Takes water as it comes to hose—continuous automatic prime, large air capacity—passes all kinds of mud and sand—nothing can get out of order—3-vane chrome alloy impeller, stainless steel shaft. Made in 5 different models, 100 to 1,500 G.P.M. capacity.

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YOU, too, may save the cost of this pipe cutter on one job, just as many other contractors and water companies have done.

The ELLIS PIPE CUTTER

with its six keen rotary cutting blades eats its way right through any pipe in double-quick time. Use No. 01 for all kinds of pipe 4 to 8 inches in diameter, or No. 1 for pipe 4 to 12 inches in diameter.

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ELLIS & FORD MFG. CO.
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ALL STYLES
Portable and Stationary
25 to 200 gallons

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Contractors and Engineers Monthly

DIRECTORY OF EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of the various lines handled. Canadian cards appear on pages 169, 170

ALABAMA—ARIZONA

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Brown Marx Bldg. Birmingham, Ala.

Representing

ROBINS—Belt Conveyors and Screens
ALDRICH—Power Driven Pumps
FOSTER-WHEELER—Pulverized Coal Equipment, Superheaters and Condensers
LO-HED—Electric Hoists
INDUSTRIAL BROWNHOIST—Locomotive Cranes
CLEVELAND—Cranes
WILLIAMS—Buckets

The Young & Vann Supply Co.

BIRMINGHAM, ALA.

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Insley Chutes, Towers, Shovels, Cranes, etc.
Parsons Ditchers, Backfillers
Smith Concrete Mixers and Pavers
Novo Hoists, Pumps
Jones-Superior Saw Rigs
Blaw-Knox Forms, Batchers Plants, Buckets
Easton Dump Bodies, Cars and Track
Worthington Pumps and Air Compressors
Rex-Watson Dump Wagons
Red Edge Shovels and Picks
General Wheelbarrows
M. & M. Form Clamps
Carey Elastite Expansion Joint
Ord Concrete Finishing Machines
Beebe Bros. All Steel Hand Hoists
Metalweld Portable Compressors

Arizona Tractor & Equipment Co.

238 W. Jefferson St. Phoenix, Ariz.

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
ATHEY Truss Wheels
BUFFALO-SPRINGFIELD Rollers
HEIL Hoists
KILLEFER Road Tools
LaPLANT-CHOATE Snow Plows
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SPEEDER Shovels
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ALLIS-CHALMERS "Monarch" Tractors
AUSTIN Trench Diggers and Backfillers
BAKER "Baker Maney" Self-Loading Scrapers
BYERS Full-Revolving Shovels and Cranes
CHAIN BELT "Rex" Mixers, Pavers, Pumps, Saw Rigs, Etc.
DIKOYL Lubricating Greases
HAISS Loaders and Conveyors
GALION Road Graders and Machinery
PIONEER Screening and Crushing Plants
ROGERS—Heavy-Duty Trailers, 10-100 Tons
TOLDO Torches
Member: Associated Equipment Distributors

LAWRENCE-GOODLING CO., Inc.

Contractors' Equipment

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EDWARDS and RYAN Road Machines
CLEVELAND Tractors
HART PARE Tractors
SIDNEY Wheelers, Drags, Plows
RANSOME Concrete Mixers, Pavers
ORTON Cranes, Shovels, Draglines
AUSTIN Trenching Machines
C. H. & E. Saw Rigs, Hoists, Pumps
FAQUHAR Engines, Boilers, Sawmills

NEIL B. MCGINNIS

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Representing

ADAMS Road Signs
BATES Tractors
BIEHL Creeper Wagons
ERIE Road Rollers
GENERAL Shovels, Cranes, Etc.
GOROCO Spreaders
HUBER Road Rollers
JAEGER Concrete Mixers, Pavers, Hoists, Pumps
INDUSTRIAL BROWNHOIST—Ditchers
GARDNER-DENVER Air Compressors, Drills
LIMA "101" Shovels, Cranes and Draglines
MILWAUKEE Gas Locomotives
MADSEN Portable Paving Plants
ORTON Cranes
PIONEER Crushing Screening and Loading Plants
RYAN-EDWARDS Motor Loading Wheel Graders
STOCKLAND Graders
SHUNK Grader Blades
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WILLIAMSPORT Wire Rope and Aerial Tramways

SMITH-PITTMAN TRACTOR CO., Inc.

Tractors and Road Machinery

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EMPIRE—Cutting Edges, Wheelbarrows, Carts
EUGLED—Crawler Dump Wagons, Power Scrapers
ATLAS—Rotary Wheel-type Scrapers, Fresno
JAEGER—Mixers and Pumps
LAKEWOOD—Finishers, Sub-grading Machinery
BLAW-KNOX—"Ball" Wagon Graders

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Representing

McKIERMAN-TERRY DRILL CO.—Pile Hammers
INDEPENDENT PNEUMATIC TOOL CO.—"Thor" Tools and Compressors
WILLIAMS—Clamshell and Dragline Buckets
ARCHER IRON WORKS—Cone Chuting Equipment
JAEGER—Concrete Mixers
ORR & SEMBOWER—Concrete Mixers & Hoists
AMERICAN STEEL & WIRE CO.—Monitor Wire Rope
DOMESTIC—Pumps and Hoists
LAKEWOOD—Subgraders, Finishing Machines, Forms, Chuting Equipment and Towers
WYOMING SHOVEL CO.—Red Edge Shovels, Scoops
LINK-BELT CO.—Crawler Cranes, Shovels, Loaders
WESTERN WHEEL SCRAPER CO.—Wheelers, Drags, Scrapers, Fresno, Tumblebug and Ploughs
BATES—Bar Ties

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Construction & Mining Machinery

306-12 South 7th Ave. Phoenix, Ariz.

Representing

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LINK-BELT Shovels, Cranes and Draglines
LAKEWOOD Mixers, Concrete Placing Equip.
CLEVELAND—Rock Drills, Air Tools, etc.
REMMELE Mixers, Small Sizes
NOVO Hoists, Engines and Pumps
LINCOLN Stable Arc Welders and Motors
EDWARDS Wire Rope
DE WALT Saws

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Representing

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NORTHWEST—Cranes, Draglines and Shovels, Pullshovels and Skimmer Scoops
OWEN—Clamshell Buckets
RAWLS—Highway Mowers

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Road Building Machinery

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"Caterpillar" Graders
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Thew Shovel Company
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BAKER Earth Moving Equipment
BAY CITY Shovels
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MUNICIPAL Oil Distributors
WYOMING Red Edge Shovels
KIMBALL-KROGH Centrifugal and Turbine Pumps
ALAMO-DORWARD Plunger Pumps

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Little Rock *Representing* Arkansas

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IRVING IRON WORKS—Subway Grating
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Structural and Reinforcing Steel and Steel Building Products

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CHICAGO AUTOMATIC Conveyors
RYAN Power Graders and Dual Blade Motor Patrols
WILLIAMS Clamshell and Dragline Buckets
HELTZEL Bins Weighing Hoppers and Road Forms—Curb, Outter & Sidewalk Forms
WIARD Pumps and Grade Rooters
LUDINGHAUS Dump Wagons
AUSTIN Treachers & Backfillers
TOLEDO Torches
CARBIC Flood Lights
REPUBLIC Concrete Mixers
UNION Steam Hammers
GOOD ROADS Crushers & Asphalt Distributors

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KOEHRING Pavers, Shovels
T. L. SMITH Mixers and Pavers
INSLEY Mast Hoists, Building Towers
PARSONS Excavators and Backfillers
C. H. & E. Pumps, Saw Tables and Hoists
CLEVELAND Rock Drills, Air Tools, Etc.
RESILIFLEX Guard Rail
HUBER Road Rollers
CEDAR RAPIDS Crushers, and Gravel Plants
SIDNEY Steel Scrapers, Wheelbarrows, Tools
SCHRAMM Air Compressors, Drills, Tools, Etc.
WICKWIRE-SPENCER Wire Mesh and Cables
CONNEAUT Hand Shovels, Cutting Edges for all makes of Graders
MONARCH Tractors
LITTLEFORD Asphalt Heaters and Equipment

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REX—Mixers and Pavers, Mortar and Plaster Mixers, Pumps and Saw Rigs
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LIDGERWOOD—Hoists, Derricks
NOVO Hoists, Etc.
MORROW—Gravel Screening and Washing Plants
INGERSOLL RAND—Compressors, Drills, etc.
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WAUKESHA—FULLER & JOHNSON—LEROI—Engines
BATES—Bar Tim
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The BROWN-BEVIS CO. 49th St. & Santa Fe Ave. Los Angeles, Cal.

Distributors
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Sullivan Machy. Co.—Compressors, Hoists
Wood Shovel & Tool Co.—Wood Molybdenum Shovels
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Continental Motors Corp.—Gasoline Engines
Gen. Halsey Mfg. Co.—Truckloaders and Conveyors
Barnes Mfg. Co.—Barnes Pumps
The Owen Bucket Co.—Clam Shell Buckets
Buckeye Traction Ditcher Co.—Curb & Trench Ditchers
Northwest Engr. Co.—Shovels, Cranes, Draglines
Traylor Engineering & Mfg. Co.—Rock Crushing Equipment
Huber Mfg. Co.—Road Rollers
Page Engineering Co.—Dragline Buckets
Littleford Bros.—Tar and Asphalt Heaters, etc.
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310 Fourth St., San Francisco, Calif.

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CURTIS PNEUMATIC MACHINERY CO.—Compressors, Hoists, Trolleys
CUSHMAN MOTOR WORKS—Gas Engines
UNIVERSAL MOTOR CO.—Gas Engines
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CONCRETE MACHY. & SUPPLY CO. 777 E. 63rd St. Los Angeles, Calif.

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CLYDE Hoists & Derricks
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Member: Associated Equipment Distributors
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HOTCHKISS Road Forms
LE ROI Engines
PARSONS Excavating Mch.
REX Mixers and Pavers
REX Pumps and Saw Tables
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SERVICISED Expan. Joints
STEARNS Elev. & Conveyors
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Schramm, Inc.
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Allie Chalmers
Rome Manufacturing Co.
Master Equipment Co.
Davis Manufacturing Co.
Brenneis Company
Osgood Company
Buffalo-Springfield Co.
Ransome Concrete Machy. Co.
W. R. Meadows Company
Hetzl Steel & Iron Co.
Novo Engine Company
—Shovels, Excavators
—Monarch Tractors
—Graders
—Scrapers, Backfillers
—Hydraulic Scraper
—Scarifiers, Road Rippers, Implements
—Shovels, Cranes, Hoes
—Rollers
—Pavers, Mixers, Towers
—Expansion Joints
—Bins, Batches, Road Forms
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STANDARD STEEL WORKS
PEERLESS MACHINERY CO.
IDEAL CONCRETE MACHY. CO.
UNIVERSAL HOIST MFG. CO.
KELLOGG AIR COMP. MFG. CO.
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Southern California Distributors for
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A. W. French & Co.—ORD Road Finishers
Browning Crane Co.—Shovels, Cranes
Domestic Eng. & Pump Co.—Road Builders and Dewatering Pumps
Insley Mfg. Co.—Placing Equip., Excavators
Lidgerwood Mfg. Co.—Hoists, Cableways
Smith Engineering Works—Crushers & Gravel Plant Equipment
The Knickerbocker Co.—Conc. Mixers, Saw Rigs
Alex. Milburn Co.—Carbide Lights, Cutting and Welding Torches
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McKiernan-Terry Corp.—Pile Hammers
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"And other principal manufacturers"

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ATHEY Truss Wheel Trailers
BAKER MANEY Scrapers
LaPLANT-CHOATE Crawler Wagons

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CEDAR RAPIDS—Crushing Plants
EASTON—Industrial Cars
FREEMAN—Turntables
GALION—Graders, Rollers
HERCULES—Power Units
JAEGER—Mixers, Hoists, Pumps, Tower Equipment
JOHNSON—Bins and Batch Hoppers
LAKEWOOD—Road Finishers, Forms, Chuting, etc.
Member: Associated Equipment Distributors
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NEW-WAY—Air-Cooled Engines
PAGE—Buckets
SAUERMAN—Cableway Excavators, Power Drag Saws
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 Milwaukee Locomotive Co.—Gasoline Locomotives
 Diamond Iron Works, Inc.—Gravel & Rock Crushing Plants
 G. H. Williams Co.—Clam Shell & Drag Line Buckets and Heavy-Duty Trailers
 Helzel Steel Form & Iron Co.—Bins, Batchers & Road Forms
 Ames Iron Works—Gasoline Road Rollers
 Union Iron Works, Inc.—Pile Hammers & Foundation Equip.
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ARCHER Steel Tower & Con-
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OHIO Locomotive Cranes
ERIE Agrometer Plants
McKERNAN-TERRY Pile
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 Huber Rollers
 Jaeger Concrete Mixers
 Johnson Batch Hoppers
 Madson Asphalt Plants
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 CLEVELAND WHEELBARROW CO.—"Red Star" Wheel-
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 RUSSEL SHOVEL CO.—Hand Shovels
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 Killefer Mfg. Corp.—Road Scarifiers, Revolving
 Scrapers
 La Plante-Choate Mfg. Co.—Tractor Trailers,
 Snow Plows, Hydraulic Bulldozers
 Illinois Wire & Mfg. Co.—Big Red Snow Fence
 Athey Truss Wheel Co.—Trailer Track Assem-
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 Flat Bottom Ditcher

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GENERAL EXCAVATOR
 Shovels, Cranes, Etc.
 STROUD Elevating Graders
 SAKER Maintainers, Plows
 ETTYRE Sprinklers & Oilers
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 WHITCOMB Locomotives
 WEHR One-Man Graders
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 SIDNEY Scrapers and Wheel-
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 CLEVELAND Rock Drills
 HOMELITE Pumps
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 CLYDE—Hoists and Derricks
 INSLEY—Towers and Concrete Placing Equipment
 LEACH—Mixers, Pavers, Saw Rigs
 WILLIAMS—Clamshell and Dragline Buckets
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 VULCAN Steam and Gasoline Locomotives
 BUTLER Bins and Hoppers
 SAUERMAN Power Scrapers, Cableway Excavators
 AUSTIN Trenching Machines, Backfillers
 METAFORM Sidewalk, Curb and Road Forms
 KNICKERBOCKER Concrete Mixers
 MULTI-FOOTE Paving Mixers
 WILLIAMS Buckets
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 Lakewood Engineering Co.
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 Morris Machine Works
 J. S. Mundy Htg. Engine Co.
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 ers
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HAISS—Loaders and Conveyors
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CARTER—Pumps
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LANSING Hoists
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SYNTEON Electric Hammers
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LE ROI Engines
ESSICK Plaster Mixers
Miscellaneous Contractors' Supplies

The K. B. NOBLE CO.

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	Rex Mixers	Herules Engines	A
	Rome Graders	LeRoi Engines	S
	Lawrence Pumps	Smith Crushers, etc.	S
	Saigon Derriks	Easton Cars, etc.	A
	Sullivan Compressors	Gard Scrapers	C
	Box Hoists	Owen Buckets	H
	National Hoists	Byers Shovels	U
	Link-Belt Loaders	Cranes, Conveyors	S
		Member:	T
	Associated Equipment Distributors	S	

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BALDWIN
CARRIC
CRESCENT
GOULDS
JACKSON
LINK-BELT
MULCONKOV
NOVO
NOVO
SASGEN
SILVER STRAND
SYNTEON
TOLEDO
PYLE-NATIONAL—Electric Flare & Head Lights
—“BOSS” Concrete Mixers
—Concrete Tower Equipment
—Shovels and Scoops
—Flare Lights, Welding Equipment
—Woodworkers and Saw Tables
—Power Pumps
—Wheelbarrows, Concrete Carts
—Malleable and Steel Chais
—Metallic Steam Hose
—Gasoline Engines
—Single and Double Drum Hoists
—Power Diaphragm & Road Pumps
—Derrick Equipment
—Wire Rope
—Electric Concrete Hammers
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Atlas Imperial Diesel Eng. Co.
Barber-Greene Co.
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Cleveland Tractor Co.
Consolidated Const. Machy. Co.
John Deere Plow Co.
Denver Rock Drill Mfg. Co.
Electric Welding Co.
Engberg's Elec. and Mech-
anical Works
Erie Steel Constr. Co.
Foote Co.—Pavers
Harsco Corp.
Hill Diesel Engine Co.
Independent Press. Tool Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Wm. H. Keller, Inc.
Mathews Conveyor Co.
Metal Forme Corp.
Page Engineering Co.
Northwest Eng. Co.
Novo Engine Co.
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OLIVER Implements
SARGENT and WALSH Snow Plows
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E. D. Etnyre & Co.
De Walt Products Co.
Chas. Hyman Co.
Littleford Brothers
Lakewood Engineering Co.
Mead-Morrison Mfg. Co.
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Fruhuf Trailer Co.
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HENRY A. PETTER SUPPLY CO.

Paducah Kentucky

Representing
American Wire Rope, Mesh
Archer Tower Equip.
Bates Bar Ties
Berg Surfaces and Finishers
Ted Carr Road Rooters
Chattanooga Wheelbarrows, Chain Belt (Rex) Mixers, Caldwell Tanks, Towers
DuPont Explosives
Duthie Derricks
Dietz Lanterns
Farquhar Engines, Boilers
Hauk Heaters and Thawers
Fruehauf Trailers
Johnson Bins and Hoppers
Lidgerwood Hoisting Machy.
O. A. Lubricants
Link-Belt Portable Conveyors
LeROI Gas Engines
Northwest Shovels, Cranes
New Pumps and Hoists
Page Buckets
Pulsometer Steam Pumps
Servicised Expansion Joint
Templeton-Kenly Jacks
Toledo Torches
Universal Con. Accessories
Vulcan File Equipment
Western Road Machinery
Westinghouse Electric Motors
Worthington Pumps, Compressors
Wyoming Shovels

Louisiana Tractor & Equipment Co.

Formerly LOUISIANA ROAD MACHY. CO. 1111 Julia Street New Orleans, La.

Representing
ATHEY TRUSS WHEEL CO.—Wagon, Trailers, Wheels
KILLEFER MFG. CORP.—Drag Scrapers, Road Scarifiers
LaPLANT-CHOATE MFG. CO.—Steel Dump Wagon, Trailers
BUFFALO-SPRINGFIELD ROLLER CO.—Road Rollers
SPEEDER MACHINERY CORP.—Auto-Cranes, Draglines
EAGLE WAGON WORKS—Dump Wagon
ELGIN CORP.—Street Sweepers and Eductors
UNIVERSAL ROCK CRUSHER CO.—Crushers

OLE K. OLSEN

325 N. Cortez St. New Orleans

Representing

Ransome Concrete Machinery Co.
McKiernan-Terry Corp.
American Cement Mach. Co.
Mundy Hoisting Engine Co.
American Saw Mill Machinery Co.
Schramm, Inc.
Ralph B. Carter Co.
G. H. Williams Co.
Dobbie Derricks

Wyoming Shovel Works
Waukena Motor Co.
Erie Bins & Batches
Patent Scaffolding Co.
Universal Form Clamp Co.
Atlas Engineering Co.
Blystone Mfg. Co.
LeRoi Co.
Cleveland Wheelbarrow Co.
H. W. Ross Co.
American Steel & Wire Co.

Member: Associated Equipment Distributors

SHREVEPORT MACHY. SALES CO.

P. O. Box 840 Shreveport, La.

Representing

Barber-Greene Company
Bay City Shovels, Inc.
Brookville Locomotive Co.
Construction Machinery Co.
Erie—Rollers
Garst—Drag Scrapers
Lightning—Sand & Gravel Pumps
Ohio Power Shovel Company—Lima "101"
Schramm, Incorporated
Smith Engineering Works
Pumps—For All Purposes

JOHN C. LOUIS COMPANY

221 S. Eutaw St. Baltimore, Md.

*Incorporated
Representing*

Jaeger Machine Company
Barnes Manufacturing Company
The Lakewood Engineering Co.
Consolidated Concrete Machinery Corp.
National Hoisting Engine Company
American Cable Company
The Browning Crane Co.
Butler Bin Company
Homelite Corp.—Pumps
Wheeling Corrugating Company
Good Roads Machinery Company
Littleford Brothers
The Foote Company
Hatchless Steel Products Company
Jones Superior Machine Co.
The Burch Corporation
Wapoot Gear Works
Member: Associated Equipment Distributors

C. T. PATTERSON COMPANY, Inc.

800 Tchoupitoulas St. New Orleans, La.

Representing

CLEVELAND Tractors
C. H. & E. Equipment
BAY CITY SHOVELS INC.
GEO. HAISS MFG. CO.
RUMSEY PUMP CO.
AMERICAN Steel & Wire
FAIRBANKS Wheelbarrows
SIMPLEX Jacks & Trench Braces
HANDY Sack Balers
REPUBLIC Conc. Mixers

EASTON CAR & CONSTR.
CO. Cars, Dump Bodies
GALION Graders and Road Machinery
WRIGHT Hoists
HELTZEL Steel Forms
MIAMI-CLETRAC Scrapers
COLUMBIA Manila Rope
HAUCK MFG. CO.
Reinforcing Steel

C. M. CONANT COMPANY

Bangor Maine

Representing

CATERPILLAR TRACTOR CO.
BARBER-GREENE CO.
WIARD PLOW CO.
LA PLANT-CHOATE MFG. CO.
SPEEDER MACHINERY CO.
SARGENT SNOW PLOWS
MARION STEAM SHOVEL CO.

THE HENRY H. MEYER CO.110 S. Howard St., Baltimore, Md.
1114-9th St., N. W., Washington, D. C.*Representing*

Austin Machinery Co.
Blaw-Knox Co.
Boston & Lockport Block Co.
Brookville Locomotive Co.
Byers Machine Co.
Chausse Oil Burner Co.
Connery & Co., Inc.
Domestic Engine & Pump Co.
E. I. Du Pont de Nemours & Co.
Dobbie Fdy. & Machine Co.
Duff-Norton Mfg. Co.

Harrington Co.
Lambert Hoisting Engine Co.
A. Leach & Sons Rope Co.
Pulacometer Steam Pump Co.
Ransome Concrete Mach. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton-Kenly Co., Ltd.
Toledo Pressed Steel Co.
Union Iron Works
Universal Road Machy. Co.

SOUTHERN STATES EQUIP. CO., Inc.

1510-1530 Tchoupitoulas St. NEW ORLEANS

Representing

P & H—Shovels, Cranes and Draglines
BLAW-KNOX—Bins, Batches, Road Forms, Buckets
ORD—Concrete Finishing Machines
FOOTE—Paving Mixers
JAEGER—Concrete Mixers
TELSMITH—Sand and Gravel Plants
DOMESTIC—Pumps, Engines
ORB & SEMBOWER—Hoisting Engines
LAKEWOOD—Concrete Chuting
UNION—Pile Hammer
THOE—Compressors and Air Tools
KOPPEL—Industrial Cars and Trucks
STANDARD—Heating Kettles
CONTINENTAL—Gas Engines
CHICAGO—Automatic Material Conveyors

MAINE ROAD EQUIPMENT CO.

Congress Bldg. Portland, Me.

Representing

Four-Wheel Drive Auto Co.
Universal Power Shovel Co.
Rome Manufacturing Co.
Universal Road Machinery Co.
Owen Bucket Co.
N. P. Nelson Iron Works
Sargent Snow Plows

THE R. D. GRIER & SONS CO.Machine Shop—Iron & Brass Foundry
SALISBURY, Del-Mar-Va Peninsula, MARYLAND*Representing*

Fairbanks, Morse & Co.
Wyoming Shovel Works
Sterling Wheelbarrow Co.
John A. Roebblings' Sons Co.
Crane Co.
National Tube Co.
International Motor Trucks
Goodyear Tire & Rubber Co.
Manhole Frames, Covers & Drain Gates

W. F. TAYLOR & SONS

509-13 Magazine St. New Orleans, La.

Representing

ST. MARY'S Diesel Oil Engines
HILL Diesel Oil Engines
ALAMO Gasoline Engine
O. K. Hoists
LANSING Concrete Mixers
GOULDS Pumps
MYERS Pumps
KELLOGG Air Compressors
STERLING Deep Well Turbines
METALASTIC Packing
MAGIC Boiler Compound

ALBAN TRACTOR COMPANY, Inc.

821-23 East 25th St. Baltimore, Md.

Representing

CATERPILLAR TRACTOR CO.
"CATERPILLAR" ROAD MACHINERY
"CATERPILLAR" COMBINE HARVESTERS
GENERAL EXCAVATORS
KILLEPER TILLAGE TOOLS
LINK-BELT SHOVELS & CRANES
LA PLANT-CHOATE MFG. CO.
WILLAMETTE-ERSTED CO.
BAKER MANUFACTURING CO.
ROTARY SNOW PLOW CO.
ATHEY TRUSS WHEEL CO.
REX-WATSON CORPORATION
FRINK SNOW PLOW CO.

THE BOND CO.

Harold L. Bond, Pres.

84 HIGH ST. BOSTON, MASS.

*Contractors' Tools and Equipment**Representing*

SMITH—Mixers and Pavers
KOEHRING—Cranes, Shovels and Mixers
PARSONS — Trench Machines and Backfillers
INSLEY—Excavators and Concrete Placing Equip.
CHICAGO—Auto. Conveyors
ROGERS—Trailers

HAUCK—Kerosene Heaters
JONES-SUPERIOR—Woodworkers
SARGEN—Derricks
JOHNSON Bins and Batches
NOVO — Gasoline Engines, Pumps and Hoists
INGERSOLL-RAND — Air Compressors
Member: Associated Equipment Distributors

WORMINGTON & POWERS, Inc.

601 Southern Bldg. New Orleans, La.

Representing

LITTLEFORD BROS. CO.—Tar & Asphalt Heaters, Road Builders' Supplies
THE KNICKERBOCKER CO.—Concrete & Mortar Mixers, Saw Rigs
OSGOOD CO.—Steam, Gas, Electric Cranes, Shovels, Draglines, etc.
W. A. RIDDELL CO.—Road Building Machinery

MEAD-MORRISON MFG. CO.—Steam, Gas & Electric Hoists & Car Pullers, Full Swing Crawler Cranes
MUNDIE MFG. CO.—Gas & Electric Air Compressors
METAL FORMS CORP.—Building, Gutter, Curbs, Sidewalk & Road Forms
SARGEN DERRICK CO.—Derricks for all purposes

D. C. ELPHINSTONE, INC.

Contractors' Equipment

120 So. Calvert St. Baltimore, Md.

Representing

KOEHRING COMPANY
T. L. SMITH CO.
INSLEY MFG. CO.
THE PARSONS CO.
CLYDE IRON WORKS
GEO. HAISS MFG. CO.
SAUERMAN BROS., INC.
McKIERNAN-TERRY CORPORATION

C. H. & E. MFG. CO.
DAYTON-DOWD CO.
GOODALL RUBBER CO.
EMERSON PUMP & VALVE CO.
GARDNER-DENVER CO.
H. K. PORTER CO.
OWEN BUCKET CO.
REED-PRENTICE CORP.

Member: Associated Equipment Distributors

C. R. DODGE COMPANY

141 Milk St. Boston, Mass.

Representing

LEACH CO.—Concrete Mixers, Mast Hoists and Saw Rigs
HELTZEL STEEL FORM & IRON CO.—Steel Forms, Bins and Batches
ROME MFG. CO.—Road Graders
CEMENT BLOCK MACHINERY CO.—Concrete Block Machines
ATLAS ENGINEERING CO.—Conveyors
PIONEER GRAVEL EQUIP. MFG. CO.—Screening, Crushing and Loading Machinery

THE EQUIPMENT CO.
23-29 Island St. Boston, Mass.

Representing
LINK-BELT Cranes and Shovels
HAISS Loaders, and Belt Conveyors
INGERSOLL-RAND Compressors and Tools
CONTINENTAL "Red Seal" Gas Engines
LIDGERWOOD Hoists

DYAR SALES & MACHINERY CO.

66 Broadway, Cambridge, Mass.
S. G. Adams Co.—Traffic Signs
J. D. Adams & Co.—Graders, Road Drags
American Cement Machy.—Concrete Mixers, Hoist
Oliver Ames & Sons Co.—Shovels, Scoops
Aeroli Burner Co.—Asphalt "Squeezer" Heaters
Barnes Mfg. Co.—Pumps Le Roi Co.—Gasoline Engines
Burth Plow Works—Spreaders and Unloaders
Baker Mfg. Co.—Truck and Tractor Snow Plows
Charles Hyatt & Co.—Sweepers, Brooms, Sprinklers, Trailers,
Asphalt Plants and Sand Spreaders
Iowa Mfg. Co.—Gravel Reduction Plants, Crushers
J. P. Healey Co.—Catch Basin Cleaners
Klein-Logan—Picks, Hammers, Crow Bars
Menominee Fence Co.—Snow Fence and Posts
Monarch Tractor Co.—Tractors
Rex-Watson Corp.—Wagons, Trailers
Western Crucible Steel Casting Co.—Shovel Teeth
Wilcox Bros.—Multi-Foot Pavers

NEW ENGLAND IMPLEMENT CO., Inc.
22 Garden St. 61 N. Beacon St.
WORCESTER, MASS. BOSTON, MASS.

Representing
International Harvester Co.
Trackson Co.
Wehr Company
Maine Steel Products Co.
Whitehead & Kales Co.
Bay City Shovels, Inc.
Willamette-Ersted Co.
Hughes-Keenan, Inc.
Sauerman Brothers, Inc.
Miami Trailer-Scraper Co.
Baker Manufacturing Co.

HEDGE & MATTHEIS COMPANY
285 Dorchester Ave. Boston, Mass.

Providence, R. I. Boston, Mass. Springfield, Mass.
Portland, Maine New Haven, Conn. Worcester, Mass.
Representing
American Tubular Elevator Co. Lawrence Pump & Engine Co.
Austin Machinery Corp. LeRoi Company
Butler Bldg. Co. A. Leschen & Sons Rope Co.
Blystone Manufacturing Co. Littleford Bros.
Cleveland Wheelbarrow & Mfg. Co. McKiernan-Terry Corp.
Easton Car & Construction Co. Mead-Morrison Mfg. Co.
Hercules Motors Corp. Milco Mfg. Co.
Homelite Corporation Sagen Derrick Co.
Ingersoll-Rand Co. The Ohio Power Shovel Co.
Jaeger Machine Co. Toledo Pressed Steel Co.
Lakewood Engineering Co. Universal Power Shovel Co.
G. H. Williams Co.
Member: Associated Equipment Distributors

BORDEN & REMINGTON CO.
115 Anawan St. Fall River, Mass.

New Bedford, Mass. *Branches* Providence, R. I.
Representing
CHAIN BELT CO.—"Rex" Mixers and Pavers
BLAW-KNOX CO.—Forms and Batchers
INGERSOLL-RAND CO.—Compressors
CARBIC MANUFACTURING CO.—Lights
HAUCK MANUFACTURING CO.—Burners
WAUKESHA AND LEROI—Engines
RASBORN—Derricks
AMES AND RED EDGE—Shovels
ATLAS—Dynamite
MARLOW—Pumps
ROYSON—Lightning Wire Twisters
CEMENT BLOCK MACHINERY CO.
WILLIAMSPORT WIRE ROPE CO.

THE MAMER COMPANY
Benton Harbor Michigan

Representing
Jaeger Machine Co.
C. H. & E. Manufacturing Co.
Skillsaw, Incorporated
Miscellaneous Equipment

P. I. PERKINS COMPANY
376 Dorchester Ave. Boston, Mass.

Representing
"CATERPILLAR" Tractors
"CATERPILLAR" Graders
WAUSAU—Plows
LA PLANT-CHOATE Bulldozers
MARLO—Pumps
PIERCE—Rollers
BYERS—Cranes and Shovels
REX—Mixers, Pavers
MUNDY—Hoists
BLAW-KNOX—Road Equipment
SCHRAMM—Air Compressors

H. F. DAVIS TRACTOR CO., Inc.
59 Montgomery Ave. Holyoke, Mass.

Representing
Cletrac Tractors
Walsh Snow Plows
Automatic Scrapers
Bulldozers
Road Plows
Saw Rigs

CYRIL J. BURKE
Great Lakes Terminal Warehouse
DETROIT MICHIGAN

Representing
Lakewood Engineering Co.
Link-Belt Co.
General Excavator Co.
Dobbie Foundry & Machine Co.
J. S. Mundy Hoisting Engine Co.
Cincinnati Car Corp.
Upson-Walton Co.
A. S. Marlow Co.

RAPP-HUCKINS COMPANY, Inc.
Established 1900
138-148 Beverly Street
North Station Industrial Bldg.
Boston, Mass.

Sales and Service
Climax "Trustworthy" Engines
Twin Disc Clutches
Buda Engines
Gasoline and Oil Engines
Telephone Capital 1322-1323

THE HOLMES-TALCOTT CO.
SPRINGFIELD, MASSACHUSETTS
HARTFORD, CONNECTICUT

Representing
SPEEDER—Shovels and Cranes
LEACH—Concrete and Plaster Mixers, Mast
Hoists and Saw Rigs
METALWELD-WORTHINGTON—Portable Air Compressors
CLEVELAND—Rock Drills
ERIE—Aggregators, Bins and Buckets
METAFORM—Steel Road Forms
HAISS—Loaders and Conveyors
AUSTIN-WESTERN—Road Machinery
CLYDE—Hoists CARTER—Pumps
HIGHWAY—Trailers
BEAUMONT—Slackline Cableway and Drag
Scraper Systems
Equipment for Contractors

Contractors' Equipment Co., Inc.
5139-5169 Martin St., Detroit, Mich.

Representing
MOORE Speedcranes, Shovels Draglines
DOMESTIC Pumps and Hoists
LEACH Mixers and Mast Plants
GARDNER-DENVER Air Compressors and tools
MULTI-FOOTE Pavers
HUBER Rollers
CEDAR RAPIDS Crushers and Gravel Handling
Equipment
A complete line of Construction Equipment

GEO. H. SAMPSON CO.
Contractors' Supplies
80 Federal St. Boston, Mass.
Telephone, Liberty 7479

New England Representatives for
INGERSOLL-RAND COMPANY
Air Compressors
Jackhammers, Pneumatic Tools, Pumps
ATLAS POWDER CO.—Dynamite
KEYSTONE Concrete Mixers
SASGEN DERRICK CO.—Derricks

M. B. TYLER COMPANY
344 Columbus Ave., Springfield, Mass.

Representing
"CATERPILLAR" Tractors, Road Machinery
and Combines (Conn. & Western Mass. Terr.)
KILLEFER Tractor Implements
LA PLANT-CHOATE Trailers and Snow Plows
WILLAMETTE-ERSTED Hoists for "Cater-
pillars"
W-K-M Hoists and Rock Crusher for Tractors
DAVIS Air Compressor Attachments for Tractors
FARQUHAR Boilers and Engines
PIONEER Gravel Equipment, Screens, etc.
HI-WAY SERVICE Snow Plows
SPEEDER Gasoline Shovels and Cranes
INGERSOLL-RAND Air Compressors, Tools
EUCLID Scrapers and Wagons
HERCULES Gasoline Rollers

**LOOK THIS DIRECTORY
OVER CAREFULLY**

If you find any errors while check-
ing over this directory will you
please advise us at once, because it
is our desire to keep it accurate and
up-to-date at all times.

**CONTRACTORS AND ENGINEERS
MONTHLY**

443 Fourth Ave. New York

THE EARLE EQUIPMENT CO.

6331-51 Tireman Ave. Detroit, Mich.

Representing
 KOEHRING CO.
 INSLEY MANUFACTURING CO.
 T. L. SMITH CO.
 THE PARSONS CO.
 C. H. & E. MFG. CO.
 G. S. JOHNSON CO.
 FOUR WHEEL DRIVE CO.
 CLEVELAND ROCK DRILL CO.
 ACME ROAD MACHINERY CO.
 SCHRAMM, INCORPORATED
 ALLIS-CHALMERS Monarch Tractors
 LIDGERWOOD Hoists
 ROEBLING Cable
 LE ROI Engines
 ROGERS Trailers
A Complete Line of Small Tools

O'NEAL TOOL & SUPPLY CO.

5327 Livernois Ave. Detroit, Mich.

Representing
 BLYSTONE MFG. CO.—Plaster and Mortar Mixers
 CHASE FOUNDRY & MFG. CO.—Industrial Cars
 GENERAL WHEELBARROW CO.—"Akron" Wheelbarrows,
 Concrete Carts, Mortar Bases, Salamanders, Scrapers,
 Coal Chutes
 STEEL SCAFFOLDING CO.—Adjustable Steel Trestles,
 Carpenters' Brackets, Ladder Jacks, Mortar Board Stands,
 etc.
Also
 Equipment for Concrete Products Plants, Concrete Mixers,
 Pumps, Engines, Saw Rigs, Gas and Electric Hoists, Shovels,
 Air Compressors, etc.

THE KELLOGG-BURLINGAME CO.

67 Market Ave., N. W. Grand Rapids, Mich.

Representing
 Novo Engine Co.
 Butler Bin Company
 Freeman Manufacturing Co.
 Knickerbocker Co.
 Union Steam Pump Co.
 F. E. Myers & Bros. Co.
 American Steel & Wire Co.
 Jones-Superior Machine Co.

WILLIAM FORD & CO., INC.

15841 Second Blvd. Detroit, Mich.

Flint—Grand Rapids—Toledo

Representing
 Ford Motor Company
 Bucar-Gibbs Plow Co.
 Ferguson-Sherman, Inc.
 Roderick-Lean Mfg. Co.
 Whitehead & Kalam Co.
 Detroit Harvester Co.
 Stow Mfg. Co.
 W. A. Riddell Co.
 Wehr Company
 Williamette-Ersted Co.
 Stoughton Company
 Restor Engr. Corp.
 Gustav Schaefer Co.
 U. S. Body & Forging Co.
 W. M. Blair Mfg. Co.
 Trackson Company
 Baker Mfg. Co.
 Sidney Steel Scraper Co.
 Perfection Steel Body Co.
 St. Paul Hydraulic Hoist Co.
 Kingham Trailer Co.
 York-Hoover Body Corp.

STODDARD DICK COMPANY

620 Polk Bldg. Detroit, Mich.

Representing
 Universal Form Clamp Co.
 Symons Clamp & Mfg. Co.
 C. A. Londelius Co.
 Geo. W. Diener Mfg. Co.
 W. O. I. Products Co.
 Kohler Die & Specialty Co.
 Little Wonder Scaffolding Co.
 Bull Dog Floor Clip Co.
 Union Steel Products Co.
 J. P. Curry Mfg. Co.
 Roos Meyer Hecht Co.
 H. K. Porter, Inc.

F. D. LAKE COMPANY

Contractors' Machinery and Tools

500 Fulton Street, S. W.
 GRAND RAPIDS, MICHIGAN

Representing
 Construction Machinery Co.—"Marsh-Capron" and "Little
 Wonder" Concrete Mixers, Pumps, Saw Rigs
 Smith Engineering Works—Gravel Washing and Rock Crush-
 ing Machinery
 General Excavator Co.—Gasoline Cranes
 Wood Shovel & Tool Co.—Mo-ly-den-um Shovels
 Keystone Driller Co.—Drills and Excavators
 Mead-Morrison Mfg. Co.—Hoisting Machinery
 Rome Mfg. Co.—Rome Graders

HUNTER MACHINERY COMPANY

221-241 Waterman Ave., Detroit, Mich.

Representing
 CHAIN BELT Mixers, Pavers,
 Pumps, Saw Rigs, Elevators
 NORTHWEST Cranes, Shov-
 els and Draglines
 BLAW-KNOX Buckets, Bins,
 Batches and Forms
 SULLIVAN Air Compressors
 HOMELITE Pumps
 SAUERMAN Draglines
 CLYDE Hoists, Derricks
 ORD Finishing Machines
 LESCHEN Wire Rope
 PULSOMETER Steam Pumps
 GOROCO Mechanical
 Spreaders
 LE ROI Engines
 LONDELIOUS Water Heaters
 SASGEN Derricks, Winches
 AUSTIN Tremblers and Back-
 fillers
 TOLEDO Torches & Horns
 McKERNAN-TERRY Pile
 Hammers
 CLEVELAND Carts and
 Wheelbarrows
 AEROIL Torches, Heaters
 ARCHER Tubular Towers
 and Spouting Equipment
 MORITZ Shouldering Ma-
 chines
 BATES Wire Ties
Member: Associated Equipment Distributors

WALLACE EQUIPMENT COMPANY

Phone: Garfield 3085

8511 Livernois Ave. Detroit, Mich.

Agents for:
 ROOS—Shores and Clamps
 UNIVERSAL—Clamps
 PATENT—Scaffolds
 PLYMOUTH—Locomotives
 HELTZEL—Steel Forms

Pingry Tractor & Equipment Co.

120-6 Scribner Ave., N. W., Grand Rapids, Mich.

Representing
 CATERPILLAR—Tractors, Road Machinery,
 Combines
 EUCLID—Automatic Scrapers, Wagons
 LA PLANT - CHOATE — Bulldozers, Trailers,
 Backfillers, Wagons
 KILLEFER—Road Rippers, Revolving Scrapers
 ATHEY—Track-type Wagons, Trailers
 PIONEER—Gravel Equipment — Universal
 Crushers
 WAUSAU—Snow Plows, Tractor Equipment

Keller Tractor & Shovel Co., Inc.

5124-70 Braden Avenue

Detroit, Michigan

Distributors of
 ATECO Hydraulic Scrapers
 BAKER MANEY Road Maintainers and Rotary Scrapers
 BUCYRUS-ERIE Shovels, Cranes and Clamshells
 "CATERPILLAR" Tractors, Graders, Combines
 WILLIAMETTE Hoist for "Caterpillars"
 KILLEFER Road and Farm Tools
 LA PLANT-CHOATE Bulldozers, Backfillers, Trailers,
 Wagons
 WILLIAMS Clamshell and Dragline Buckets
 WAUSAU Snow Removal Equipment

E. K. S. EQUIPMENT CO.

18 Ellsworth Ave., S. W. Grand Rapids, Mich.

Representing
 KOEHRING CO.
 INSLEY MFG. CO.
 T. L. SMITH CO.
 THE PARSONS CO.
 C. H. & E. MFG. CO.
 MacWHYTE CO.—Cable
 ALLIS-CHALMERS—"Monarch" Tractors
 LIDGERWOOD MFG. CO.
 LANSING COMPANY
 ERIE STEEL CONSTRUCTION CO.
"Complete Line of Small Tools"

FRED W. LEMCKE

Liberty Street and Park Place

JACKSON MICHIGAN

Representing
 KNICKERBOCKER—Concrete Mixers, Saw
 Rigs, Mortar and Plaster Mixers
 NOVO—Gas Engines, Gas and Electric Hoists,
 Pumps and Dragline Equipment
 CHAUSSE—Portable Asphalt Plants, Tar Ket-
 tles, Tool Heaters, Mixer Heaters, Torches,
 Etc.
 AMERICAN-MARSH—Centrifugal Pumps (All
 sizes and stages)
 NORTHERN—Portable and Semi-Portable Con-
 veyors for Sand, Gravel and Concrete

R. G. MOELLER COMPANY

14415 Meyers Rd. Detroit, Mich.

Representing
 American Tubular Towers
 Barnes—Pumps
 Erie—Steel Bins, Aggregators and Buckets
 Goodall—Hose, Boots and Slickers
 General—Wheelbarrows, Concrete Carts
 Ingersoll-Rand—Compressors, Air Tools
 Knickerbocker—Concrete Mixers, Saw Rigs
 Lacawana—Steel Sheet Piling
 National—Hoisting Engines and Winches
 Sagen—Derricks and Winches
 Thew—Shovels, Cranes and Draglines
 Union—Pile Hammers, Mixers, Air Locks
 Wickwire-Spencer—Wire Rope, Blocks, etc.
 Wood—Shovels, Picks and Mauls
Member: Associated Equipment Distributors

HUNTER MACHINERY COMPANY

530-532 Monroe Ave., N. W. Grand Rapids, Mich.

Representing
 CHAIN BELT Mixers, Pavers,
 Pumps, Saw Rigs, Elevators
 NORTHWEST Cranes, Shov-
 els and Draglines
 BLAW-KNOX Buckets, Bins,
 Batches and Forms
 SULLIVAN Air Compressors
 HOMELITE Pumps
 SAUERMAN Draglines
 CLYDE Hoists, Derricks
 ORD Finishing Machines
 LESCHEN Wire Rope
 PULSOMETER Steam Pumps
 GOROCO Mechanical
 Spreaders
 LE ROI Engines
 LONDELIOUS Water Heaters
 SASGEN Derricks, Winches
 AUSTIN Tremblers and Back-
 fillers
 TOLEDO Torches
 McKERNAN-TERRY Pile
 Hammers
 CLEVELAND Carts and
 Wheelbarrows
 AEROIL Torches, Heaters
 ARCHER Tubular Towers
 and Spouting Equipment
 MORITZ Shouldering Ma-
 chines
Member: Associated Equipment Distributors

Upper Peninsula Tractor Co.

L'Anse Michigan

Representing
 "CATERPILLAR" Tractors
 "CATERPILLAR" Graders
 "CATERPILLAR" Harvesters
 ATHEY Truss Wagons
 ROTARY Snow Plows
 WAUSAU Snow Plows
 KILLEFER Road Machinery
 PIONEER Gravel Equipment

K. B. HUBBARD CO., INC.

214-18 Kalamazoo St. Lansing, Mich.

Representing
 "Baumert" Draglines and Bins
 "Blizzard Buster" Metal Snow Fence
 "Champion" Snow Plows
 "Edwards" Motor and Road Graders
 "Good Roads" Gravel Plants and Equipment, Crushers, Distributors, Rollers, Motor and Road Graders, etc.
 "Hardy Sandy" Sand Spreaders
 "Hawm" Crawler Loaders
 "Ryan" Motor Controlled Graders
 "Sargent" Snow Plows
 "Shunk" Blades
 "Snow King" Snow Plows
 "Snooper" Gasoline Shovels
 "Sterling" Hoists
 "Towm" Road Drags
 Trenches, Cable, Shovels, Snow Fence, etc.

THORMAN W. ROSHOLT CO.

928 So. Fourth St. Minneapolis, Minn.

Representing
 IOWA "Cedar Rapids" RYAN Graders
 Crusher Plants & Equip- JOHNSON Batchers and De-
 ment mountable Bins
 KOEHRING Pavers, Mixers, RIDDELL Power Graders
 CRANES TRACKSON Loaders & Cranes
 SMITH Pavers and Mixers TRAILMOBILE Semi- and 4-
 INSLEY Towers and 1/2-yard Wheel Trailers
 Shovels VULCAN Steam and Gas Lo-
 PARSONS Trenching Ma- cumotives
 chines, etc. MEAD-MORRISON Hoists,
 McCORMICK - DEERING Shovels, Cranes
 Industrial Tractors M. & M. Column Clamps
 C. H. & E. Saw Rigs, Hoists, SARGENT Snow Plows
 Pumps METAL FORMS CORP.
 KWIK-MIX Mixers Steel Forms
 Member: Associated Equipment Distributors

MISSISSIPPI TRACTOR & EQUIPMENT CO.

301-307 W. Capitol St., Jackson, Miss.

Representing
 CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
 WILLAMETTE-ERSTED—Hoists for Caterpillar Tractors
 ALL-STEEL PRODUCTS MFG. CO.—Winches for Caterpillar Tractors
 SPEEDER MACHINERY CORP.—Crane Shovels and Draglines
 TOWERS & SULLIVAN—Tractor Plows
 ATLAS SCRAPER CO.—Rotary Scrapers

MICHIGAN EQUIPMENT CO.

Pontiac Michigan

Representing
 REPUBLIC IRON WORKS—Concrete Mixers
 BALDWIN TOOL WORKS—Shovels
 AMERICAN CABLE CO.—"Tru-Lay" Wire Rope
 SLUSSER-McLEAN SCRAPER CO.—Scrapers
 N. P. NELSON IRON WORKS—Loaders

WM. H. ZIEGLER CO., INC.

Minneapolis and Duluth Minnesota

Representing
 GARDNER-DENVER Air Compressors
 REX Mixers and Pavers, Pumps
 BATES Wire Tires
 PLYMOUTH Gasoline Locomotives
 Crawler Type Bottom and 3-Way Dump Wagons
 WILLIAMS Clamshell Buckets and Trailers
 STERLING Wheelbarrows and Carts
 AUSTIN Trenching Machines, Backfillers
 "CATERPILLAR" Tractors and Graders
 BUCYRUS-ERIE Steam and Gas Shovels
 LITTLEFORD BROS. Tar Heaters, Kettles, etc.
 BUTLER Bin and Measuring Hoppers
 BARBER-GREENE CO. Conveyors and Loaders
 KILLEFER Road Tools
 Member: Associated Equipment Distributors

Waterhouse Equipment Co., Inc.

Jackson, Mississippi

Representing
 I. H. C.—Tractors ATHEY—Trum Wheel Wag
 RYAN—Graders on
 SIDNEY—Wheeler, Sipe & TRACKSON—Crawlers
 FLOW PIONEER—Gravel Equip.
 CULVERTS—Corrugated MULTI-FOOTE—Pavers
 Metal
 DU PONT—Explosives ALEMITE—Lubricants
 LESCHEN—"Hercules" Wire BAY CITY—Tractor Shovels
 Rope HUBER—Road Rollers
 AUSTIN—Ditchers KALMAN—Reinforcing Steel
 WYOMING—Raovels
 Member: Associated Equipment Distributors

LANGE TRACTOR & EQUIPMENT COMPANY

304 Lake Avenue, So. 192 Park Street
 DULUTH, MINN. PORT ARTHUR, ONT.

Representing
 CATERPILLAR TRACTOR CO.—"Caterpillar" Tractors and Road Machinery
 LA PLANT-CHOATE MFG. CO.—Bulldozers, Backfillers, Wagons and Snow Plows
 PIONEER GRAVEL EQUIP. MFG. CO.—Gravel Equipment
 KILLEFER MFG. CORP.—Road Tools, Farm Implements
 WILLAMETTE-ERSTED CO.—Tractor Hoists

NORTHFIELD IRON COMPANY

487 Nico St. Northfield, Minn.

N. W. Distributors
 BRITEMARK—Traffic Markers
 HUG—Roadbuilder Trucks
 OSHKOSH—Four-wheel Drive Trucks
 ROOT SPRING Truck Scrapers
 TRUCK and TRACTOR Snow Plows
 LANSING—Scrapers, Concrete Mixers, etc.
 PANAMA—Mixers and Concrete Machinery
 TOLEDO—Trenches and Steel Horses
 GROUNDHOG Revolving Tractor Scrapers
 RELIANCE—Rock Crushers and Screening Plants
 INDESTRUCTIBLE—Grader and Conveyor Belts
 MODERN—Pumps and Generators
 SCHRAMM—Air Compressors and Tools
 BLIZZARD-BUSTER All Steel Snow Fence
 NICO METAL and INLAND Copper Alloy Culverts
 SUPERIOR Pure Iron Culverts
 Structural Steel and Bridges, Catch Basin Covers, Manholes & Flap Gates

JOHN R. KEY

CARTHAGE MISSOURI

Representing

LANDRETH MACHINERY CO.
 K-M Grader Patrol
 AMERICAN CEMENT MACHY. CO.
 Mixers
 BARNES MANUFACTURING CO.
 Pumps

H. E. ERICKSON CO., Inc.

247 Second Ave., So. Minneapolis, Minn.

CONTRACTORS' EQUIPMENT AND SUPPLIES

Klickerbocker Concrete Plaster and Mortar Mixers
 Sackett Spouting
 Sagen Derrick
 Column Clamps
 Elite Scaffold Brackets
 Nove Engines
 Nove Hoists
 Nove Pumps
 Dragline Buckets
 Puffer & Hubbard Wheelbarrows
 Duff Trench Braces
 Cement Tools of all kinds
 Cement Sack Balers
 Chicago Automatic Conveyors
 Steel Dump Bodies
 Form Clamps
 Tie and Form Wire
 Saw Rigs

BORCHERT-INGERSOLL, INC.

St. Paul, Minn. Duluth, Minn.

American Tubular Towers
 McKiernan-Terry Pile
 Ball Wagon Graders
 BB All Steel Hand Hoists
 Blaw-Knox Conc. Forms, Clamshell Buckets, Clyde Hoists, Derricks
 Domestic Pumps
 Euclid Crawler Wagons
 Gallon Graders
 Haiss Loaders
 Highway Sanders
 Koppel Industrial Cars
 McHiernan-Terry Pile
 Monarch Tractors
 Northern Conveyors
 Northwest Shovels and Cranes
 Nye Steam Pumps
 Ord Road Finishers
 Ransome Pavers and Towers
 "Snow King" Plows
 Stroud Elev. Graders
 Willett Spring Blades
 Whitcomb Gasoline and Electric Locomotives
 Member: Associated Equipment Distributors

E. A. MARTIN MACHINERY CO.

501-23 Schools St. Joplin, Mo.

420 W. Commercial St., Springfield, Mo.

Representing
 "CATERPILLAR" Tractors
 "CATERPILLAR" Road Graders
 "CATERPILLAR" Combines
 WONDER Concrete Mixers
 MARSH-CAPRON Mixers
 SCHRAMM Air Compressors
 ATHEY Trum Wheel Wagons
 KILLEFER Road Tools
 SPEEDER Shovels, Cranes, Etc.
 CLEVELAND Red Star Barrows and Carts
 BLAKE Type Jaw Crushers
 CORNISH Crushing Rolls
 LAPLANT-CHOATE Bulldozers
 WILLIAMSPORT Wire Rope
 LEROI Engines
 MACLEOD CO. Heaters

MINNEAPOLIS EQUIPMENT CO.

Minneapolis, Minnesota

Our own Office, Shop & Warehouse
 514 - 520 Second St., South East

Archer Iron Works
 Cleveland Wheelbarrow Co.
 Fisher & Hayes Co.
 Humphreys Mfg. Co.
 Harbison Rock Drills
 Hotchkiss Steel Co.
 Jager Machine Co.
 Jones-Superior Machine Co.
 J. S. Mundy Engine Co.
 National Brake & Electric Co.
 Nelson Spreader Tie Co.
 Schofield-Burkett Excavators
 Erie Steel Construction Co.
 Carr Graders
 Osgood Company

WE DO NOT CHOOSE TO RUN—

anything in this Directory that is not accurate and up-to-date. Therefore, if you find any errors or corrections we hope you will let us know about them. Thank you.

CONTRACTORS AND ENGINEERS MONTHLY

443 Fourth Ave. New York

BUBLITZ MACHINERY COMPANY

2139 Washington St., Kansas City, Mo.

Representing

Thew Shovel Co.
 Universal Crane Co.
 Jaeger Machine Co.
 Lakewood Engineering Co.
 Construction Division
 Highway Truck Mixer Co.
 Metalweld-Worthington Inc.
 Cleveland Pneumatic Tool Co.
 Cleveland Rock Drill Co.
 G. H. Williams Co.
 Butler Bin Co.
 Lidgerwood Manufacturing Co.
 Cleveland Wheelbarrow & Mfg. Co.
 Ames Shovel and Tool Co.
 MacWhyrte Co.
 Skilaw Inc.

FUNKHOUSER EQUIPMENT CO.2425 Jefferson Street
KANSAS CITY MISSOURI*Representing*

LAKEWOOD—Road Forms, Finishers, Sub-Graders
NORTHWEST—Cranes, Shovels, Draglines
DOMESTIC—Pumps and Hoists
RYAN—Graders and Maintainers
SULLIVAN—Compressors, Drills, Air Hoists
MUNDY—Hoists, Electric Gas and Steam
McKERNAN-TERRY—File Hammers
RANSOME—Mixers, Pavers, Tower Equipment
ERIE—Bins, Aggregators, Buckets
DOBBIE—Derricks and Derrick Fittings
PAXSON—Saw Rigs
BARTLETT & SNOW—Truck Bodies
TRU-LAY—Wire Rope
Member: Associated Equipment Distributors

FICKEISSEN-FINNEY EQUIPMENT COMPANY

4930-32 Southwest Ave. St. Louis, Mo.

Representing

BYERS Shovels and Cranes NOVO Engines, Hoists and Pumps
MARSH-CAPRON and WONDER Mixers HOTCHKISS Forms
HAISS Loaders and Conveyors ARCHER Concrete Tower Equipment
BATES Tractors PORTO Electric Saws
STOCKLAND Graders PAGE Buckets
JOHNSON Bins and Batches GOLD MEDAL Dynamite

Member: Associated Equipment Distributors

C. F. RABBEIT, INC.

1519 No. Broadway St. Louis, Mo.

Representing

BAY CITY—Truck Cranes LITTLEFORD—Asphalt Heaters, Pouring Pots, Paving Tools
BLAW-KNOX—Bins, Batchers, Buckets, Inundators, Road & Sidewalk Forms
C. H. & E.—Saw Rigs, Pumps, Hoists, Mortar Mixers
A. W. FRENCH—"ORD" Concrete Road Finishers
HUBER—Gasoline Rollers
INSLEY—Concrete Placing Equip. Buckets, Chutes, Towers, Hoppers, Carts, Clamps, Excavators, etc.
McLOSKEY—Trenches
KOEHRING—Pavers, Mixers, Cranes, Shovels and Draglines
M & M—Wire, Column and Tie-Rod Clamps, Wire Cutters and Nippers
PARSONS—Trenchers, Back-Fillers and Ditchers
F. L. ROGERS—Electric Hand Saws and Tools
T. L. SMITH—Tilting and Non-Tilting Mixers, Pavers
STERLING—Wheelbarrows and Carts
WESTERN—Carts and Trucks

KENNEY MACHINERY COMPANY*Road Building Equipment*2301 Grand Avenue Kansas City, Mo.
1120 So. Atlanta Ave. Tulsa, Okla.

Phone: Victor 5363

Representing

BYERS Cranes and Shovels
ORD Concrete Road Finishers
MULTI FOOTE Pavers
BARNES Pumps
CHICAGO PNEUMATIC Compressors & Tools

LAWRENCE V. FRALEY & SON

Buder Building St. Louis, Mo.

Representing

Barber-Greene Co.
The Fate-Root-Heath Co.
PLYMOUTH Locomotives
Sauerman Brothers, Inc.
Baker Steel & Machinery Co.

THE GEO. F. SMITH COMPANY*Representing*

Le Roi Co. Skidder Shovel Co.
Smith Engineering Works Jaeger Machine Co.
Cleveland Wheelbarrow Co. Bates Valve Bag Corp.
Lakewood Engineering Co. McKernan-Terry Corp.
Clyde Iron Wks. Sales Co. Hauck Mfg. Co.
Universal Crane Co. Waukesha Motor Co.
Owen Bucket Co. Ingersoll-Rand Co.
Jones-Superior Mach. Co. Homelite Corporation
Saugen Derrick Co.

Franklin and Channing Aves., St. Louis

Member: Associated Equipment Distributors

O. B. AVERY COMPANY

1325 Macklind Ave. St. Louis, Mo.

Allis-Chalmers Manufacturing Co.
United Tractor & Equipment Corp.
Buckeye Traction Ditcher Co.
Domestic Engine & Pump Co.
Koppel Ind. Car & Equip. Co.
Galion Iron Works & Mfg. Co.
Toledo Pressed Steel Co.
National Hoisting Engine Co.
Sullivan Machy. Co. Northwest Engrg. Co.
Iowa Mfg. Co. Davenport Loco. Wks.
Butler Bin Co. Stroud Ed. Machy. Co.
Chain Belt Co. G. H. Williams Co.
Farquhar Company Wood Shovel Co.
Smith Trailer Corp. Page Engineering Co.
Member: Associated Equipment Distributors

S. T. HATCHER & CO.

4528 Easton Ave. St. Louis, Mo.

Representing

KNICKERBOCKER—Concrete Mixers, Mortar Mixers, Saw Rigs
THOR—Air Compressors, Tools
PARKS—Woodworking Machines
LE ROI—Gasoline Engines

TULLEY EQUIPMENT CO., Inc.

4451 Duncan St. St. Louis, Mo.

Representing

Orten Crane & Shovel Co.—Cranes, Draglines, Buckets
Easton Car & Construction Co.—Carts and Trucks
Twin Disc Clutch Co.—Clutches
Heltzel—Road, Sidewalk, Curb and Gutter Forms
Heltzel—Bins and Measuring Devices
LeROI Co.—Gas Engines
Leach Co.—Mixers, Saw Rigs
Milwaukee Locomotive Mfg. Co.—Gasoline Locomotives
M & H Valve & Fdy. Co.—Water Works Valves and Fittings
Rogers Bros. Corp.—Trailers
Toledo Pressed Steel Co.—Trenches
Waterous Co.—Fire Hydrants, etc.

CORBY SUPPLY COMPANY

3942-46 West Pine Blvd., St. Louis, Mo.

Representing

BUCKEYE TWIST DRILL CO.—Twist Drills, Reamers
BUHL COMPANY—Portable Air Compressors
CROWE MFG. CO.—Portable Power Saws
DETROIT HOIST & MACH. CO.—Air Hoists
HARDSCOGG—Rock Drills, Paving Breakers
WM. H. KELLER, Inc.—Super Pneumatic Tools
PENNSYLVANIA—Air Compressors, Pumps
READING CHAIN & BLOCK CORP.—Hoists
RIVET CUTTING GUN CO.—Rivet Busters
N. A. STRAND & CO.—Flexible Shaft Equipment
UNION—Portable Woodworking Tools
VAN DORN—Electric Drills, Grinders, Buffers
VICTOR—Welding and Cutting Torches
GUSTAV WIEDEKE & CO.—Tube Expanders

LAKEWOOD EQUIPMENT CO.

1900 No. Ninth St. Saint Louis

Representing

LAKEWOOD—Paving, Building and Industrial Equipment
GENERAL EXCAVATIONS—Shovels, Cranes, Skimmers, Draglines, Back-hoes, etc.
METALWELD-WORTHINGTON—Compressors
MUNDY—Hoists and Cableways
DOBBIE—Derricks and Winches
PIONEER—Gravel Screening, Crushing and Washing Plants
HIGHWAY Shoulder Machines
CLEVELAND PNEUMATIC Air Tools
HERCULES Rollers

CONNELLY MACHINERY CO.

124 No. 27th St. Billings, Mont.

Representing

CATERPILLAR TRACTOR CO.—"Caterpillar" Tractors, Harvesters and Road Machinery
ATHEY TRUSS WHEEL CO.—Track-Type Wagons and Trailers
LAPLANT-CHOATE MFG. CO.—Snow Plows, Backfills and Bulldozers
HIGHWAY SERVICE CORPORATION—Snow Plows
KILLEFER MANUFACTURING CO.—Road Rippers, Rotary Scrapers and Farm Implements
PIONEER GRAVEL EQUIPMENT MFG. CO.—Gravel Crushing and Screening Equipment
WILLAMETTE-ERSTED COMPANY—Tractor Hoists
NORTHWEST ENGINEERING CO.—Shovels, Draglines and Cranes
BUCKEYE TRACTOR DITCHER CO.—Trench Excavators and Backfills

JOHN FABICK TRACTOR CO.

2812-14 Iowa Ave. St. Louis, Mo.

Representing

Caterpillar Tractor Co.
Euclid Crane & Hoist Co.
LaPlant-Choate Mfg. Co.
Baker Mfg. Co.
Killefer Mfg. Co.
Willamette-Ersted Co.
Davey Compressor Co.
W. K. M. Company

THE LINCOLN EQUIPMENT AND MATERIALS COMPANY

1510 No. 13th St., St. Louis, Mo.

Representing

Austin-Western—Graders—Rollers—Crushers
Ransome—Pavers—Mixers—Towers—Chutes
Erie—Bins—Aggregators—Clamshell Buckets
Willamette-Ersted—Truck Cranes and Hoists
Austin—Trench Machines and Backfills
Ingersoll-Rand—Air Compressors and Air Tools
Keystone—Excavators—Skimmer—Pulley
Barnes—Pumps—Centrifugal—Plunger and Road Pumps
We Sell or Rent
We Have the Equipment and a Desire to Please

HALL-PERRY MACHINERY CO.

802-12 E. Iron St. Butte, Montana

Representing

American Cable Co. (Trulay Cable)
Austin Machinery Corp.
Butler Bin Co.
Chain Belt Co. (Rex Mixers)
The Cleveland Tractor Co.
Fruehauf Trailer Co.
Four Wheel Drive Auto Co.
Galion Iron Works & Mfg. Co.
George Hais Mfg. Co.
Novo Engine Co.
Rotary Snow Plow Co.
Schramm, Inc.
Smith Engineering Works (Tel Smith)
Speeder Machinery Corporation
Thew Shovel Co.

Northwest Equipment Co., Inc.

Box 1112 Great Falls, Mont.

Complete Line of Road Machinery and Contractors' Equipment

Representing

KOERHING — Mixers and Pavers
PARSONS — Trenchers
T. L. SMITH — Mixers and Pavers
INSLEY — Concrete Towers & Chuting
D-A — Lubricants
OWEN Buckets
ELGIN Street Sweepers
MONARCH Tractors
C. F. & E. Saw Rigs and Pumps
CLYDE Hoists, Car Pullers, Derricks
BUHL — Portable Air Compressors, Tools
PIONEER Gravel Equipment

INTERSTATE MACHINERY & SUPPLY CO.

Omaha, Nebraska

CLIMAX Engines
MARSH-CAPRON Mixers
WONDER Mixers, Pumps and Hoists
NOVO Engines, Pumps and Hoists
BEEBE Hand Hoists
MONARCH Tractors
OSGOOD Shovels, Cranes
STERLING Wheelbarrows
PLYMOUTH Locomotives
RED EDGE Shovels, Picks
IDEAL Block Machines
AUSTIN Trenching Machines
WILLIAMS Buckets and Trailers
BUTLER Bins
HOTCHKISS Steel Forms
METALWELD - WORTHINGTON — Air Compressors
AMERICAN Wire Rope
BAY CITY Cranes, Shovels
CHICAGO Auto. Conveyors
JONES-SUPERIOR Saw Rigs
RANSOME Pavers and Tower
MORRIS Sand Pumps
FISHER & HAYES Form Clamps
BAKER Scrapers
McKERNAN-TERRY Pile Hammers and Drills
WAUKESHA Engines
 Member: Associated Equipment Distributors

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CONTRACTORS AND ENGINEERS MONTHLY

443 Fourth Ave. New York

HAVRE TRACTOR AND EQUIPMENT CO.

Havre Montana

Representing

Caterpillar Tractor Co.
 Killefer Mfg. Corp.
 LaPlant-Choate Mfg. Co.
 Williamette-Ersted Co.

C. A. PRESCOTT & CO.

448 Washington Ave., Belleville, N. J.

Representing

Cleveland Tractor Co.
 Shaw Enoch Graders
 Essex Bulldozers
 Hussey Bulldozers
 Sargent Snow Plows
 Walsh Snow Plows
 Ross Truck Plows
 Freeman Four Wheel Drive Trucks

CONTRACTORS EQUIPMENT CO.

Jersey Journal Bldg., Jersey City, N. J.

Representing

Advance-Humely Thresher Co., Inc.
American-Terry-Derrick Co.
American Tubular Elevator Co.
American Vitrified Products Co.
Atlas Powder Company
Austin-Western Road Mch. Co.
Buffalo Steel Company
Concrete Steel Company
G. M. T. Company, Inc.
Hazard Manufacturing Co.
Independent Pneumatic Tool Co.
Lidgerwood Mfg. Co.
The T. L. Smith Company
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Union Iron Works
G. H. Williams Company
Wyoming Shovel Works

PETRIE TRACTOR & EQUIPMENT COMPANY

Brewery Bldg. Missoula, Mont.

Western Montana Dealers for

"CATERPILLAR" Track-Type Tractors
"CATERPILLAR" Combines
"CATERPILLAR" Road Machinery
PIONEER Gravel Equipment
ATHEY Track-Type Wagons & Trailers
LaPLANT - CHOATE Snow Plows
UNIVERSAL Crushers
JAEGER Mixers
NORTHWEST Shovels
KILLEFER Road Tools
WILLAMETTE Logging Equipment

HEYNIGER BROTHERS

Contractors Equipment

6th Ave. and F St. Belmar, N. J.

JAEGER Concrete Mixers
JAEGER Placing Plants
AEROIL Torches, Heaters
 Steel Sidewalk and Wheelbarrows
 Curb Forms Mortar Tubs
 "Mud Hog" Pumps Steel Mortar Boxes
 Material Elevators Picks and Shovels
 Air Compressors Tarpsaulins
 Gasoline Hoists Scaffold Horses
 Trench Pumps Electric Drills & Saws
 Garbic Lights Chain Hoists

C. A. LIPPINCOTT & BROS., INC.

3rd and Union Streets

MOORESTOWN, N. J.

Phone 263

Representing

CLETRAC Crawler Tractors
ADAMS Leaning Wheel Graders
EUCLID Scoops and Track Wheel Wagons
SCHAEFER Automatic Scoops
SARGENT Snow Plows
BAKER Snow Plows
ESSEX Bulldozers
KILLEFER Road Building Tools

AMERICAN MACHINERY & SUPPLY COMPANY

1113-17 Howard St. Omaha, Nebr.

Representing

Jaeger Mixers & Pumps
Link-Belt Shot & Draglines
Sullivan Air Compressors and Tools
Red Star Wheelbarrows
Le Roi Engines
Tru-Lay Wire Rope
Whitcomb Locomotives
H. & B. Gravel Pumps
Johnson Bins and Batches
Aerol Burners
Sageen Derricks
Sterling Hoists
Waukesha Engines
Lakewood Finishing Machines
Lakewood Towers, Buckets and Cans
Owen Churnshell Buckets
Buckeye Trench Machines & Backfillers
Multi-Foot Pavers
Barber - Greene Ditchers
Loaders, Belt Conveyors
 Member: Associated Equipment Distributors

BAUER TRACTOR COMPANY, Inc.

81 Water St. Bridgeton, N. J.

Representing

CATERPILLAR TRACTOR CO.

Tractors — Graders — Combines
ATHEY TRUSS WHEEL CO.
LaPLANT-CHOATE MFG. CO.
KILLEFER MFG. CO.
HI-WAY SERVICE CORP.
WILLAMETTE-ERSTED CO.

DALE & RANKIN, INC.

113 Frelinghuysen Ave., Newark, N. J.

Representing

A. S. Marlow
Sterling Wheelbarrow Co.
Black & Decker
Wright Mfg. Co.
Ingersoll-Rand Co.

FUCHS EQUIPMENT COMPANY

OMAHA, NEB.

Representing

REX Pumps, Saw Rigs
REX Mixers and Pavers
BLAW-KNOX Form, Buckets
AMERICAN Manganese Pumps
M. & M. Form Clamps
BUCKEYE-ERIE Shovels
LITTLEFORD Asphalt Spreaders
SAUERMAN Cablesaws
INGERSOLL-RAND Compensators
LE ROI Engines
WHITCOMB Locomotives
TEL-SMITH Crushers
BARNES Pumps
CLYDE Hoists
GENERAL Wheelbarrows
LESCHEN Hercules Cable
ATLAS Shores
ERIE Gravel Pumps
TWIN CITY Engines
WAUKESHA Engines
WOODS Molybdenum Shovels
ORD Conc. Road Finishers
DU PONT Explosives
 Member: Associated Equipment Distributors

North Jersey Tractor Co., Inc.

Bell Terminal Garwood, N. J.

Representing

Caterpillar Tractor Co.
 "Caterpillar" Graders
Athey Truss Wheel Co.
The Creeper Wheel Co.
La Plant-Choate Mfg. Co.
Hi-way Service Corp.
Killefer Mfg. Co.
Willamette Iron & Steel Works

INTERSTATE EQUIPMENT CORP.

Construction Equipment Division

331-33 South St. Newark, N. J.

Representing

BUCKEYE TRACTION DITCHER CO.—Trench Excavators
ATLAS MINERAL PRODUCTS CO.
 Genuine "G. K."
SANITARY SEWER BASIN CO.
 Manholes, Catch Basins

JOHNSON & DEALAMAN, Inc.

60 Marshall St. Newark, N. J.

Representing

RANSOME Pavers, Mixers and Chuting Equipment
 NORTHWEST Gasoline Shovels and Cranes
 JOHNSON Steel Bins and Baitness
 ERIE Gasoline Rollers
 CARTER Centrifugal, Diaphragm and Force Pumps
 LAKEWOOD Finishing Machines, Subgraders and Forms
 WILLIAMS Trailers and Buckets
 CLEVELAND Wheelbarrows, Batch Boxes, and Adjustable Shores

SLADE TRACTOR CO., INC.

36 Learned St. Albany, N. Y.

Representing

"CATERPILLAR" TRACTOR CO.
 Tractors—Graders—Harvesters
 KILLEFER MFG. CO.
 EUCLID CRANE & HOIST CO.
 MAKEE MANUFACTURING CO.
 D-A LUBRICANT CO.
 HI-WAY SERVICE CORP.
 LA PLANT-CHOATE MFG. CO.
 WILLAMETTE-ERSTED CO.
 ATHEY TRUSS WHEEL CO.

J. H. WELCH

21 Terrace Buffalo, N. Y.

Representing

H. W. Roos Company, Inc.
 Patent Scaffolding Co.
 Construction Machinery Co.
 Rumsey Pump Co.
 A. S. Marlow Co.
 Humphreys Mfg. Co.
 Skilaw, Inc.
 Joyce-Cridland Co.
 Hutchinson Mfg. Co.
 Black & Decker Mfg. Co.
 O. K. Clutch & Machinery Co.
 Wyoming Shovel Works
 Hauck Manufacturing Co.

C. H. LOOMIS & CO.

304 Jelliff Ave. Newark, N. J.

Representing

Chain Belt Co.
 Le Roi Co.
 Domestic Engine & Pump Co.
 Schramm, Inc.
 Aeroil Burner Co.
 Wodack Electric Co.
 Jackson Mfg. Co.

JOHN R. TINKLEPAUGH924 Central Ave. 949 Western Ave.
ALBANY, N. Y.*Also*

LIVINGSTON Columbia Co. NEW YORK

Distributors

CLETRAC Tractors, New and Rebuilt
 EUCLID Wheel Scrapers and Fresno
 SARGENT Snow Plows
 WAUSAU Snow Plows
 PERRY Scrapers
 SHAWNEE One-man Pull-type Graders
 GALION Road Graders
 JOHN DEERE Plows
 ESSEX Hydraulic Backfillers
 WALSH Hydraulic Snow Plows
 WALSH Bulldozers

THE WHEELER-MURRAY CO.329-331 Ellicott St. Buffalo, N. Y.
Rochester, N. Y.—Syracuse, N. Y.*Representing*

Ahlers Concrete Regulators
 American Tubular Towers
 Cleveland Rock Drills, Tools
 Willett Maintainers
 Erie Aggregators & Clamshell Buckets
 Essick Plaster Mixers
 Homelite Pumps and Electric Plants
 Hotchkiss Steel Road Forms
 Hug Roadbuilders, Trucks & Subgraders
 Sargent Snow Plows
 Jones-Superior Woodworkers
 Littleford Heating Kettles & Tools
 Mead-Morrison Shovels, Cranes and Tractors
 National Hoists & File Driven
 Nevo Engines, Hoists, Pumps
 Lima "101" Shovels
 Ransome Pavers, Mixers & Towers
 Richmond Conc. Specialties
 Wehr Graders, Rollers
 F. W. D. Trucks
 Rogers Heavy Duty Trailers
 Schramm Air Compressors
 Rotary Snow Plows

TRACTOR & EQUIPMENT CO.

520-522 Passaic Ave. Newark, N. J.

Representing

McCORMICK-DEERING Industrial Tractors
 HUGHES-KEENAN Iron Mules and Cranes
 TRACKSON Full Crawlers, Cranes, Loaders
 WEHR Graders and Rollers
 BLAIR Bulldozers and Diggers
 THALEG & HOOK Travel Cranes
 WHITEHEAD & KALES Sweepers and Cranes
 JOLLET International Hoists
 BARTON Portable Pumps
 MIAMI Scrapers and Trailers
 SARGENT Snow Plows
 MARION Shovels

W. B. MAY, Inc.

41 Perry Street Buffalo, N. Y.

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ACME Road Rollers
AUSTIN Trenching Machines
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KOPPEL Industrial cars
HAISS Loaders, Conveyors
REX Pumps
PAGE Dragline Buckets
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EAGLE Dump Wagons
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CYCLONE Drills
SULLIVAN Air Compressors
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ROOS Shores
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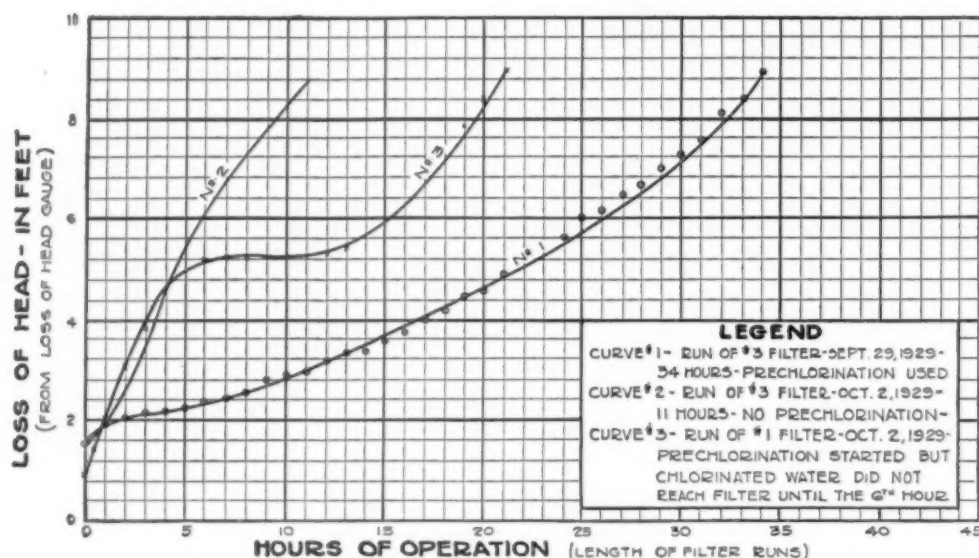
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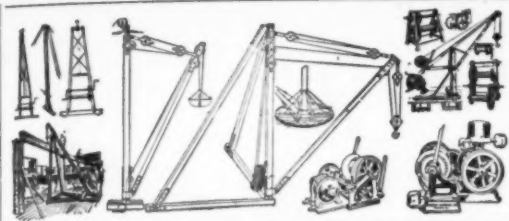
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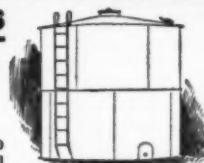


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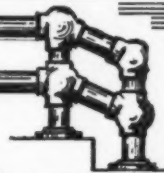
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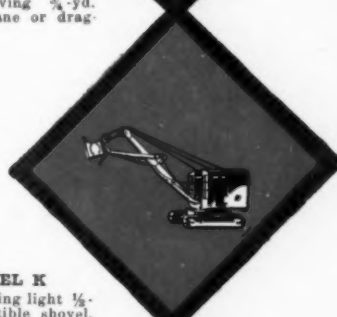
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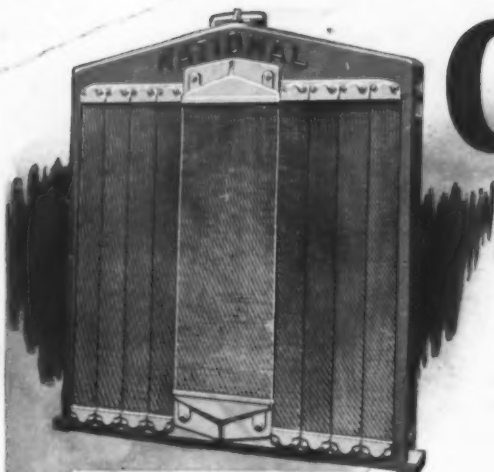


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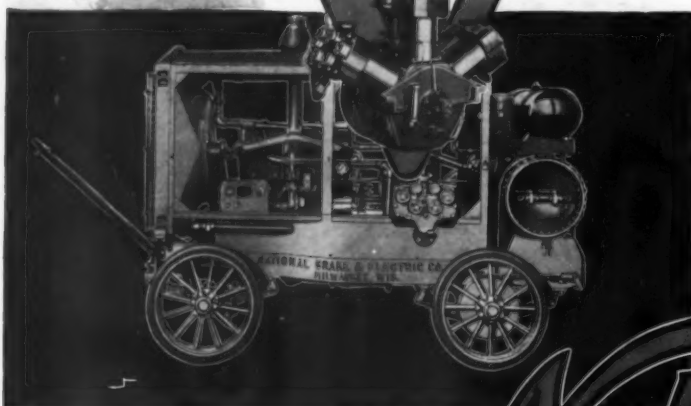
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